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SEP 79 J A ALMEIDA , R L HARVEY
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AN ANALYSIS OF THE RELATIONSHIPS BETWEEN
DEMOGRAPHIC FACTORS AND MAINTENANCE
TECHNICIANS' ATTITUDES TOWARDS TECHNICAL DATA

James A. Almeida, Captain, USAF
Richard L. Harvey, Captain, USAF

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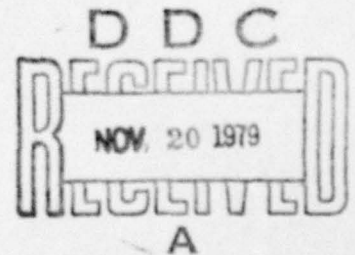
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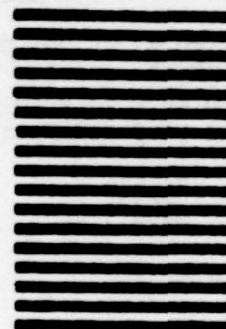
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In a 1978 Air Force Institute of Technology Master's thesis, Bunch, Holsen, and Ward surveyed 546 maintenance technicians to determine their attitudes toward conventional technical orders (T.O.s). The object of this research effort was to perform a secondary statistical analysis on the Bunch, Holsen, and Ward data to determine whether six demographic variables (AFSC, skill level, pay grade, amount of maintenance experience, amount of supervisory experience, and weapon system) have a significant impact upon maintenance technicians' attitudes toward technical data. Four specific aspects of technical orders were examined: adequacy, level of writing, usage (purposes T.O.s used for), and frequency of usage. It was concluded that the technicians' perceptions of both the adequacy and the level of writing of their technical data differed significantly by AFSC. Additionally, it was found that the technicians' perceptions of the usage of their technical orders differed significantly by AFSC, skill level, pay grade, and weapon system. Finally, it was found that the technicians' perceptions of the frequency of usage of their technical data were significantly different for all six demographic variables tested.

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TECHNICIANS' ATTITUDES TOWARDS
TECHNICAL DATA

A Thesis

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Logistics Management

By

James A. Almeida, MBA
Captain, USAF

Richard L. Harvey, BA
Captain, USAF

September 1979

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CHAPTER I

INTRODUCTION

Statement of the Problem

In 1978 Bunch, Holsen, and Ward studied the attitudes of maintenance technicians toward conventional technical orders (T.O.s). They reported that the technicians generally felt that their technical data were current, accurate, and compatible with the equipment they maintained. However, a significant portion of the technicians reported dissatisfaction with the T.O.s lack of depth with respect to troubleshooting information and explanation of complicated equipment and procedures (3:75-76).

Due to time constraints, Bunch, Holsen, and Ward's analysis was restricted to gross results. They were not able to analyze the available data in sufficient depth to determine whether there were significant differences between the perceptions of various groups/classifications of technicians. The research problem is to analyze the Bunch, Holsen, and Ward data to determine whether demographic variables (i.e., pay grade, AFSC, skill level, amount of maintenance experience, amount of supervisory experience, and weapon system)

have a significant impact upon maintenance technicians' attitudes toward technical data.

A secondary statistical analysis of this data may detect deficiencies in weapon system technical data for particular groups / classifications of maintenance technicians. For example, different maintenance specialties and skill levels may use the technical order for different purposes, and they may use different portions of the T. O. Therefore, a technical order may be deficient in a specific area for one group of maintenance technicians, but adequate in the same area for another group of technicians.

Since an increasing number of younger airmen are manning the maintenance technician career fields (6), technical orders should be geared toward the needs of these younger, less experienced technicians. Therefore, it is important to know whether the needs of these younger technicians differ from those of the older, more experienced technicians.

Justification for the Research

In 1962 a study conducted for the Aerospace Medical Research Laboratories (AMRL) recommended that the structure and content of Air Force technical orders be changed to make them more useful to maintenance technicians (1:17). Since then, the Air Force Human Resources Laboratory (AFHRL) has experimented with new types of

technical data to overcome deficiencies in conventional technical orders.

Improved types of technical data have the potential for increasing the efficiency of maintenance personnel, while reducing costs (8:13). Research indicates that savings can be achieved by a reduction in technical training requirements, a greater use of less experienced personnel, a reduction in the number of spare parts used, and the achievement of greater productivity by maintenance personnel (8:90-93).

The Air Force Human Resources Laboratory (AFHRL) has conducted, and also sponsored, several studies evaluating maintenance technicians' attitudes toward both old and/or new types of technical data. As a result of these studies, in particular the Bunch, Holsen, and Ward study which evaluated maintenance technicians' attitudes toward conventional T.O.s, the laboratory is uncertain whether there are significant differences between the attitudes of various groups/classifications of maintenance technicians regarding technical data. Therefore, AFHRL has requested that a secondary statistical analysis be performed on the Bunch, Holsen, and Ward data to answer this question.

Objectives

The objectives of this research are to examine the responses to the 1978 Bunch, Holsen, and Ward questionnaire to:

1. Determine if maintenance technicians' perceptions of the adequacy of their technical data are related to six demographic factors (i.e. AFSC, skill level, pay grade, maintenance experience, supervisory experience, and weapon system).

2. Determine if maintenance technicians' perceptions of the level of writing in the technical data they use are related to the six demographic factors.

3. Determine if maintenance technicians' perceptions of the primary use or purpose of technical data are related to the six demographic factors.

4. Determine if maintenance technicians' perceptions of the frequency with which they use their technical data are related to the six demographic factors.

Research Propositions and Hypotheses

Proposition 1 (Research Hypotheses 1 through 6)

Maintenance technicians' perceptions of the adequacy of their technical data are related to the six demographic variables.

Research Hypothesis 1

Maintenance technicians' perceptions of the adequacy of their technical data are related to their AFSC.

Research Hypothesis 2

Maintenance technicians' perceptions of the adequacy of technical data are related to their skill level.

Research Hypothesis 3

Maintenance technicians' perceptions of the adequacy of their technical data are related to their pay grade.

Research Hypothesis 4

Maintenance technicians' perceptions of the adequacy of their technical data are related to their maintenance experience.

Research Hypothesis 5

Maintenance technicians' perceptions of the adequacy of their technical data are related to their supervisory experience.

Research Hypothesis 6

Maintenance technicians' perceptions of the adequacy of their technical data are related to their weapon system.

Proposition 2 (Research Hypotheses 7 through 12)

Maintenance technicians' perceptions of the level of writing of their technical data are related to the six demographic variables.

Research Hypothesis 7

Maintenance technicians' perceptions of the level of writing of their technical data are related to their AFSC.

Research Hypothesis 8

Maintenance technicians' perceptions of the level of writing of their technical data are related to their skill level.

Research Hypothesis 9

Maintenance technicians' perceptions of the level of writing of their technical data are related to their pay grade.

Research Hypothesis 10

Maintenance technicians' perceptions of the level of writing of their technical data are related to their maintenance experience.

Research Hypothesis 11

Maintenance technicians' perceptions of the level of writing of their technical data are related to their supervisory experience.

Research Hypothesis 12

Maintenance technicians' perceptions of the level of writing of their technical data are related to their weapon system.

Proposition 3 (Research Hypothesis 13 through 18)

Maintenance technicians' perceptions of the usage of their technical data are related to the six demographic variables.

Research Hypothesis 13

Maintenance technicians' perceptions of the usage of their technical data are related to their AFSC.

Research Hypothesis 14

Maintenance technicians' perceptions of the usage of their technical data are related to their skill level.

Research Hypothesis 15

Maintenance technicians' perceptions of the usage of their technical data are related to their pay grade.

Research Hypothesis 16

Maintenance technicians' perceptions of the usage of their technical data are related to their maintenance experience.

Research Hypothesis 17

Maintenance technicians' perceptions of the usage of their technical data are related to their supervisory experience.

Research Hypothesis 18

Maintenance technicians' perceptions of the usage of their technical data are related to their weapon system.

Proposition 4 (Research Hypotheses 19 through 24)

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to the six demographic variables.

Research Hypothesis 19

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their AFSC.

Research Hypothesis 20

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their skill level.

Research Hypothesis 21

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their pay grade.

Research Hypothesis 22

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their maintenance experience.

Research Hypothesis 23

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their supervisory experience.

Research Hypothesis 24

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their weapon system.

CHAPTER II

LITERATURE REVIEW

Introduction

Rapid advances in technology have resulted in the use of increasingly complex equipment. Technical orders are the maintenance technician's primary source of information regarding the operation and maintenance of Air Force equipment. Therefore, the accuracy, reliability, and useability of technical data is of prime importance to the maintenance technician.

This chapter will review the literature that has examined the attitudes of maintenance technicians toward technical data since 1962.

1962 AMRL Study

In 1962 a study of the Air Force maintenance technical data system was conducted for the Aerospace Medical Research Laboratories. One of the objectives of the survey was "to identify weaknesses in the content, and utilization of Air Force maintenance technical data [1:1]." The study included a survey of 2300 maintenance technicians from 19 Air Force organizations. The personnel responding to the survey represented a wide variety of weapon systems.

It was found that the lower skill levels used technical orders more for training, and less for troubleshooting than did the higher skill levels (1:18). Additionally, the lower skill levels indicated a higher frequency of use of the T.O. as a performance aid at the work station (1:19).

In general, maintenance technicians felt that the time spent in seeking required information from technical orders was excessive. It was found that the higher skill levels generally spent more time in T.O. research than did the lower skill levels. The majority of the technicians who spent more than 10 percent of the total job time in T.O. research were in the 311X0 (Guidance System), 314X0 (Missile Analyst), and 301X0 (Airborne Radio) career fields (1:19).

It was found that personnel in higher skill levels, in field maintenance activities, and in missile maintenance activities made the most frequent use of T.O.s on a weekly basis. Therefore, the study concluded that " . . . the more highly trained and experienced individuals make the most frequent use of the technical orders [1:20]."

The study evaluated the use of technical orders in the following maintenance functions (1:20-22):

1. Adjustment--The maintenance technicians felt equipment adjustment was the maintenance function for which the most frequent use of the T.O. as a performance aid was made. Technicians in the higher skill levels, and in the missile maintenance

specialties were the most frequent users of the T.O. for this purpose.

2. Inspection of Equipment--Technicians in the lower skill levels performed the highest percentage of equipment inspections. Therefore, personnel in these skill levels showed the highest frequency of use of technical data for this purpose. Here again, missile maintenance was the specialty that indicated the highest frequency of T.O. use.

3. Repair--Technicians in the higher skill levels made more frequent use of the T.O. for this function than did technicians in the lower skill levels. It was found that missile maintenance, air-frame repair, and aircraft systems maintenance were the specialties that made the most frequent use of the T.O. for this function.

4. Replacement of Components and Assemblies--The frequency of T.O. use for this purpose showed little variation with respect to skill level or specialty code. It was found that the lower skill levels, and jet engine mechanics in field maintenance made slightly more frequent use of the T.O. for this function than did the other maintenance technicians.

5. Servicing of Checkout of Equipment--Technicians in the higher skill levels made more frequent use of the T.O. for this purpose than did technicians in the lower skill levels. Additionally, it was found that due to the nature of the missile maintenance technician's

job, this specialty used the T.O. for this purpose two to three times more frequently than did technicians in other maintenance specialties.

6. Troubleshooting--This was the maintenance function for which the next to highest use of the T.O. as a job performance aid was indicated. It was found that technicians in the higher skill levels made the most frequent use of the T.O. for this purpose.

A large percentage of maintenance technicians identified the same weaknesses in technical orders (1:14). The survey responses identified "a need for change in the size, structure and content of T.O.s, to make them more useful both as a training text and as a job performance aid [1:16]."

The study proposed the following recommendations to make the T.O.s more effective:

1. More step by step instructions.
2. Better (more accurate) and more complete schematics.
3. A means of upgrading technical data to reflect field experience.
4. T.O.s which do not require referral from one to another to get required information.
5. More T.O.s in the form of checklists, work cards, and pocket size books which will be available for immediate reference on the job.
6. A revised numbering and indexing system that will simplify the task of locating needed information [1:17].

1971 Jarmon and Weaver

In 1971 Jarmon and Weaver analyzed the usefulness of the technical aids used in the Air Force Communications-Electronic-Meteorological (CEM) maintenance area. The objective of their research was " . . . to examine and relate the results of prior research in instruction presentation techniques to the current and projected . . . CEM maintenance environment [5:12]. "

Jarmon and Weaver concluded that the design of USAF CEM technical orders had not kept pace with changes in the ground CEM environment, or with advances in performance and technology. They found that fully proceduralized performance aids not only increased maintenance accuracy and efficiency, but also overcame many of the deficiencies in current technical orders. Additionally, their findings indicated that the introduction of some of the newer maintenance concepts in performance aids would permit the use of a lower aptitude technician force. Jarmon and Weaver believed that it would then be possible to sustain or improve maintenance effectiveness while reducing training and personal acquisition costs (5:62-63).

The study found that the relative efficiency of proceduralized instructions generally increased as the complexity of the equipment increased. However, Jarmon and Weaver found that at some point, which was different for every CEM system, the cost of proceduralization became prohibitively large when compared to the increase in

efficiency that would be achieved through the use of the proceduralized instructions (5:63).

The deficiencies that Jarmon and Weaver found in CEM technical orders were similar to the deficiencies that the 1962 AMRL study found in technical orders. Thus, their study indicated that CEM technical orders did not reflect the technician's needs (5:63). Technicians reported that the T.O.s contained design specifications, drawings, and schematics which were more appropriate to equipment design evaluation and installation than to the problems encountered in troubleshooting (5:63). Consequently, Jarmon and Weaver suggested that the T.O.s would be more effective if they were redesigned to function as proceduralized job performance aids which would provide help in performing certain tasks (5:6).

A portion of the study included surveying a relatively small sample of 70 ground CEM maintenance technicians from the Flight Facilities Equipment Repairman career field (AFSC 304X1). This AFSC was chosen because the authors felt that this specialty was characterized by a relatively uniform maintenance environment (5:37). The survey was designed to relate technicians' attitudes to changes in maintenance instruction design (5:40).

The survey responses indicated that technicians' attitudes toward the value of a T.O. were influenced primarily by the aid's apparent contribution to job performance. Additionally, the study

found that technicians' attitudes were also influenced by the design of the aid (5:66).

Jarmon and Weaver concluded that maintenance technicians' attitudes towards performance aid design did not appear to be significantly related to the technician's age, time in service, skill level, or formal training. However, due to their small sample size, Jarmon and Weaver were limited in the number of groups that they could construct for a given demographic variable. Technician's age contained only two groups: under 31 years of age, and 31 years of age or older. Time in service also contained only two groups: less than 4 years of service, and 4 years of service or more. Formal training contained two groups: graduate of academic course 3ABR30431, and non-graduates of this academic course. A larger sample size would have permitted Jarmon and Weaver to make a greater differentiation between the different groups contained within the different demographic variables, particularly for the variables of age and time in service (5:53).

1975 AFHRL Study

In 1975 the Military Airlift Command (MAC) replaced the standard dash-two series C-141A Technical Orders with Job Guides. The Air Force Human Resources Laboratory conducted a study to evaluate the user acceptance and perceived usability of the job guides at Charleston Air Force Base and Norton Air Force Base, the two

bases where the job guides were developed and initially introduced (9:1).

In an early phase of the study AFHRL conducted a survey " . . . to measure the attitudes of maintenance technicians toward conventional T.O.s prior to their replacement by . . . Job Guides [4:5]." The objectives of the survey were to determine whether maintenance technicians' attitudes toward technical data had changed since the 1962 AMRL study. The study found that the technicians' perceptions were that technical orders had not significantly improved since 1962, and that many of the technical order problems that were identified in the 1962 study still existed (4:5-7).

A second survey was performed at the two bases shortly after the introduction of the job guides. Eighty percent of the technicians that took part in the survey indicated a preference for the job guides over the old technical orders. Inexperienced military and supervisory personnel expressed the most positive attitudes toward the job guides. Experienced military personnel and civilians in non-supervisory positions generally expressed the most negative attitudes toward the job guides (7:2).

1976 AFHRL Study

This study was conducted for AFHRL to evaluate three types of technical data used for troubleshooting. Two new types of data, Fully Proceduralized Troubleshooting Aids (FPTAs) and Logic Tree

Troubleshooting Aids (LTTAs), were compared to the standard technical orders (8:13-14). Each type of technical data was evaluated in terms of its development cost, technical accuracy, and effectiveness in troubleshooting (8:16). Maintenance technicians participating in the study were divided into three experience levels: no experience¹, less than six months experience, and over six months experience (8:52).

The effectiveness of the three types of technical data was evaluated in an experiment which measured the ability of the technicians to troubleshoot representative equipment faults using each type of data. Technical data effectiveness was measured by the proportion of problems correctly solved, the mean number of parts incorrectly used by each subject, and the mean time required to isolate and repair each problem (8:60-62).

The results of the experiment demonstrated that the use of the FPTA or the LTTA led to significantly better troubleshooting than the use of the T.O.² This finding was consistent for two of the three measures: proportion of problems solved and spare parts consumed (8:86-87).

The T.O. resulted in better performance for the mean time to isolate and repair each problem at the organizational maintenance

¹Recent graduates of Keesler Technical Training Center.

²Technicians in the no experience category used only the FPTAs and LTTAs.

level, but not at the intermediate level. For the no-experience technicians, the use of the FPTA resulted in superior performance over the LTТА on all measures of effectiveness. For the experienced technicians, the use of the FPTA resulted in only slightly better performance over the LTТА on all measures, except for time to troubleshoot at the organizational level (8:2).

Surprisingly, the use of the FPTA resulted in essentially equal performance regardless of technician experience level. The results of the experiment suggested that the use of proceduralized troubleshooting data could reduce technical training requirements, and result in significant savings in spare parts (8:86-87).

Technicians in all experience categories expressed a preference for proceduralized troubleshooting data over the T.O., and in general a preference for the FPTA over the LTТА (8:91).

1977 Richardson and Syster

In 1977 Richardson and Syster made a study of user acceptance and perceived useability of the C-141 Job Guides. They surveyed maintenance technicians at McChord Air Force Base and McGuire Air Force Base, two bases that were not involved in the development of the job guides, and compared their responses to the responses of the 1975 AFHRL survey discussed earlier.

The 1977 survey questionnaire was designed to gather demographic information, and to evaluate user acceptance and perceived

useability of the C-141A Job Guides (9:64). The survey questionnaire was intentionally made similar to the 1975 AFHRL survey to make a comparative analysis possible (9:68). The sample of maintenance technicians given the questionnaire came from a stratified, randomly selected list provided by Hq MAC. The sample was composed of 150 technicians from each of the two bases. The sample was equally divided among the Avionics Maintenance Squadron, the Field Maintenance Squadron, and the Organizational Maintenance Squadron. Additionally, the sample was 75 percent military and 25 percent civilians (9:74-75).

The study's findings follow:

1. In general, it was found that the respondents had a favorable attitude toward and preferred the job guide to other forms of technical data. However, the responses indicated that there were still some technical problems with the job guides that remained to be resolved (9:163-164).
2. The user acceptance of C-141A Job Guides was found to be a few percentage points lower than that measured by the AFHRL survey. However, the acceptance was still generally high. This study concluded that user acceptance was slightly higher at bases which participated in the development and pre-implementation over those bases that did not participate (9:165).
3. There was no significant difference found between

this survey and the 1975 AFHRL survey. "In both surveys, the perceived useability of the C-141A Job Guides was found to be generally very favorable [9:166]." This study concluded that users at the development bases did not perceive the job guides to be significantly more useable than users at bases that did not participate in the development of the job guides (9:166).

4. Richardson and Syster found no significant difference between pay grades with regard to user acceptance of the C-141A Job Guides. However, four of the five statistical hypotheses showed movement in the predicted direction--lower grade technicians showed a greater preference for job guides than did higher grade technicians. The results from three of these four statistical hypotheses were statistically significant. However, Richardson and Syster concluded that the results of the statistical tests did not provide adequate support to conclude that the lower grade technicians had a significantly higher degree of acceptance of the job guides, than did the higher grade technicians (9:136-138, 167).

5. The study found no significant difference between pay grades with regard to perceived useability of C-141A Job Guides. Four of the five statistical hypotheses showed movement in the predicted direction--the lower grade technicians perceived the job guides to be more useable than did the higher grade technicians. The results from only one of these five statistical hypotheses were found to be

significant, which led Richardson and Syster to conclude that technicians' perceptions of the useability of job guides did not vary with pay grade (9:148-150, 167).

1978 Bailek and Kulas

Bailek and Kulas studied the acceptance and useability of C-141 Job Guides at two MAC bases where both job guides and conventional technical orders were being used concurrently. The study found a high degree of acceptance for the job guides. In general, the job guides were perceived to be more useable than conventional technical orders. The maintenance technicians surveyed indicated an overall preference for job guides; yet, conventional T.O.s were preferred for nonroutine tasks (2:73-74).

1978 Bunch, Holsen, and Ward

This study, conducted in 1978 by Bunch, Holsen, and Ward, concentrated on user attitudes toward technical data in maintenance training, the day-to-day work environment, and as an aid to troubleshooting (3:6). The justification for this study was derived from the cost reductions that could result from enhanced maintainability of weapon systems through more effective technical data.

A survey questionnaire was developed using questions extracted from the 1962 AMRL study. The objectives of the survey were to obtain demographic information and to determine the

acceptability of USAF technical data (3:17-18). Six hundred questionnaires were mailed to six Air Force installations representing three major commands (3:35). The survey was given to active duty enlisted personnel in aircraft maintenance and ground-launch missile maintenance. The personnel had to be members of the regular USAF, and in a skill level of one through seven (3:21-22).

The objectives of the study were: (1) to assess maintenance technicians' attitudes toward the technical data they used, (2) to compare the results of the survey with those of the 1962 AMRL study, and (3) to compare technicians' attitudes toward technical data for newer weapon systems against those for older weapon systems³ (3:75-77).

The study found that generally technicians rely upon T.O.s as a procedural guide. The technicians reported that the technical data were generally current, accurate, and compatible with the equipment they maintained. However, a significant proportion of technicians were dissatisfied with the troubleshooting information and explanation of complicated equipment and procedures. This study concluded that maintenance technicians generally have a favorable attitude toward technical data despite indications of some inadequacies in the technical data (3:76).

³Newer weapon systems for this study were C-5 and F-15, and older weapon systems were C-130 and F-4.

This study found insufficient evidence to support the hypothesis that USAF technical data had generally improved since 1962. This study, therefore, concluded that technicians perceived no significant improvement in technical data since the 1962 AMRL study. The study also concluded that maintenance technicians perceived no difference between technical data of newer and older weapon systems (3:76-77).

Summary

A review of the literature pertaining to Air Force maintenance technical data reveals that there appears to be no significant improvement in technical data since the 1962 AMRL study. In their 1978 study Bunch, Holsen, and Ward concluded that maintenance technicians perceive no difference in the technical data of newer weapon systems compared to that of older weapon systems.

The 1962, 1971, 1975, and 1978 studies indicated user dissatisfaction in the areas relating to troubleshooting, step-by-step procedures, and explanations of complex equipment. Yet, the studies indicate that, in general, the maintenance technician's perception of technical data is favorable.

Several of the studies reviewed referred to various demographic variables, even though they were not the primary concern of the studies. The 1962 study reported that the purposes for which

T.O.s were used varied by skill level, and that the frequency with which they were used varied by skill level and AFSC. The 1971 study concluded that technicians' attitudes toward performance and design did not appear to be significantly related to technician age, time in service, skill level, or training background. However, due to the small sample size, Jarmon and Weaver were limited to comparing the attitudes of only two groups in most cases. A larger sample size would have increased the likelihood of detecting group differences. The 1975 study indicated that a difference in technicians' attitudes toward job guides existed based on maintenance experience and supervisory positions. The 1977 Richardson and Syster study concluded that no significant difference existed between pay grades with regard to perceived acceptance or useability of C-141 Job Guides. However, several of their statistical hypotheses indicated a difference in attitudes.

None of the studies that were reviewed specifically addressed the relationship between demographic variables and maintenance technicians' attitudes toward technical data. When this relationship was discussed, it was addressed only as a secondary issue. The findings of the various studies concerning the relationship of demographic variables to technicians' attitudes were contradictory and limited in scope. Based upon the findings of the 1962 and 1975 studies the research hypotheses discussed earlier were formulated.

CHAPTER III

METHODOLOGY

Introduction

This chapter describes the methodology that was used to accomplish the research. The following topics are discussed: the survey questionnaire, the sample, the statistical tests, the criteria tests, and the assumptions and limitations of the study.

The Survey Questionnaire

The Bunch, Holsen, and Ward survey questionnaire provided data pertaining to demographic information and the technicians' perceptions regarding adequacy, level of writing, usage, and frequency of usage of Air Force technical data. Appendix A contains a copy of the questionnaire.

The specific demographic information that the questionnaire provided were:

1. Air Force Specialty Code (Questions 1 through 6)
2. Skill Level (Question 4)
3. Pay Grade (Question 8)
4. Maintenance Experience (Question 9)

5. Supervisory Experience (Question 10)

6. Weapon System⁴ (3:84-85)

Two variables, Air Force Specialty Code (AFSC) and weapon system, provided nominal level data, while the remaining variables, skill level, pay grade, maintenance experience, and supervisory experience, provided ordinal level data.

Adequacy is defined as the degree to which maintenance technicians perceive technical orders contributing to their job. Questions 29, 33, 48, 50, 51, and 56 were identified as being indicators of the adequacy of technical orders. All of these questions provided ordinal level data, except for question 33 which provided nominal level data.

Level of writing is defined as the level of understanding for which the T.O. is written. Questions 34, 49, and 52 were identified as being indicators of the level of writing of the T.O. Question 34 provided nominal level data, while the remaining two questions provided ordinal level data.

Usage is defined as the primary purposes for which the T.O. is used. Questions 30 and 31 are indicators of T.O. usage. Both questions provided nominal level data.

⁴Weapon system information was obtained by noting from which base a completed questionnaire was mailed.

Frequency of usage is defined as the number of times the T.O. is used. Questions 26, 27, and 54 are indicators of the frequency of T.O. usage. Questions 26 and 54 provided ordinal level data. Question 27 provided nominal level data, however, the decision was made to delete response "e" so that the question would provide ordinal level data, and be a more meaningful indication of the frequency of T.O. usage.⁵

The validity of the questionnaire was established by an analysis of the questionnaire with regard to the 1962 AMRL study, and a discussion with AFHRL personnel (3:20).

The Sample

Bunch, Holsen, and Ward selected their sample based on the following criteria:

1. Maintenance technicians assigned to Military Airlift Command (MAC), Strategic Air Command (SAC), and Tactical Air Command (TAC);

⁵ Survey Question 27:

To what extent do you actually use the T.O. at your work station as a performance aid to tell you what to do next or what to check for in the task indicated?

- a. Always
- b. Frequently
- c. Seldom
- d. Never
- e. Use work cards

2. Technicians having AFSCs: 31XXX [Missile Electronic Maintenance], 32XXX [Avionic System], 34XXX [Training Devices], 40XXX [Intricate Equipment Maintenance], 42XXX [Aircraft System Maintenance], 43XXX [Aircraft Maintenance], and 44XXX [Missile Maintenance];

3. Technicians responsible for maintenance of the following weapon systems: C-5, C-130, RF-4, F-15, B-52, KC-135, and Minuteman III;

4. Technicians who are in the one, three, five, and seven skill levels;

5. Technicians who are in the organizational and intermediate levels of maintenance;

6. Technicians who are not at the depot level of maintenance;

7. Personnel who are not assigned to staff positions [3:22].

Based upon these criteria, a sample of 600 maintenance technicians was selected. One hundred questionnaires were mailed to each of six different Air Force installations.⁶

Statistical Tests

Nonparametric statistical tests were used to analyze the data because these tests: (1) do not require any assumptions about the population from which the sample was drawn, and (2) require data of only nominal or ordinal strength (3:31, 33). Two statistical tests were used: the Chi Square (χ^2) and the Kruskal-Wallis One-way Analysis of Variance (ANOVA) by ranks.

⁶Each installation represented a different weapon system, except in the case of the B-52 and KC-135 weapon systems. One installation was selected to represent both of these weapon systems.

Chi Square Test for K Independent Samples

The χ^2 test was used to evaluate the responses to those questions that provided nominal level data (i. e. , questions 30, 31, 33, and 34. The test was used to determine whether the differences in responses among the independent groups for each of the six demographic variables were significant for each of these four questions. Hence, the χ^2 test was applied 24 times.

Using question 33 as an example, the significance of the differences in responses to the question was tested for each of the six demographic variables. A test was performed to determine whether the differences in the responses to the question among the different AFSCs were significant. The null hypothesis for this test was that there are no differences in responses among the various AFSCs with respect to the T.O.'s value as a training device. The alternate hypothesis was that there are differences in responses among the various AFSCs.

The null hypothesis was tested by applying the formula:

$$\chi^2 = \sum_{i=1}^n \sum_{j=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where:

O_{ij} = observed number of cases categorized in the i^{th} row of the j^{th} column.

E_{ij} = number of cases expected under H_0 to be in the i^{th} row of the j^{th} column.

r = number of rows

k = number of columns (10:175)

A contingency table of size $k \times r$ was constructed. For example, the different responses to question 33 comprised the columns, while the different AFSCs comprised the rows (see Table 3-1). The cells formed by the intersection of the rows and columns contained the actual number of responses, the O_{ij} s, for all possible combinations of AFSCs and response categories. The responses for each row and column were then totaled (10:178).

The expected frequency, E_{ij} , for each cell was determined by computing the product of the two marginal response totals (row total times column total) common to each cell, and then dividing this product by the total number of responses (10:178).

The null hypothesis was tested at the 0.05 level of significance using a one-tailed test. The computed value of χ^2 with degrees of freedom equal to $(k-1)(r-1)$ was compared to the critical χ^2 with the same degree of freedom and level of significance. In order for the computed value of χ^2 to be meaningful for a χ^2 with degrees of freedom greater than one, it was necessary that the E_{ij} s for each of the cells were equal to or greater than one, and that the E_{ij} s for at least eighty percent of the cells were equal to or greater than five.

Table 3-1

χ^2 Contingency Table for Question 33*
(Comparison of Responses versus AFSCs)

Response AFSC	a	b	c
31			
32			
34			
40			
42			
43			
44			

*Survey Question 33: In your opinion, how good are T.O.s as a training device?

- a. No improvement needed.
- b. Should be improved.
- c. Handier if training information were in one book and the work information in another.

If the computed value of χ^2 was greater than the critical value of χ^2 , then the null hypothesis was rejected. The rejection of the null hypothesis led to the conclusion that significant differences in responses among the various AFSCs exist in question 33 (10:178).

The χ^2 test was applied five more times to question 33. Each time the test was applied a different demographic variable was used. The remaining three nominal level questions were also tested using this procedure.

Kruskal-Wallis One-way (ANOVA) by Ranks

The K-W test was used to evaluate the responses to those questions that provided ordinal level data (i. e., questions 26, 27, 29, 48, 49, 50, 51, 52, 54, and 56). This test was used to determine whether the differences in the responses to a given question represented random fluctuations, or whether these differences represented genuine population differences (10:184).

Each ordinal level question was tested using each of the six demographic variables. Using question 56 as an example, a test was performed to determine whether the differences in responses among the various AFSCs were significant. The null hypothesis for this test was that the mean responses for the various AFSCs are equal. The alternate hypothesis was that at least one of the AFSCs has a mean response different from at least one of the other AFSCs.

The Kruskal-Wallis test rank ordered each of the responses from lowest to highest, and then summed the rankings for each AFSC (see Table 3-2). The test compared these sums by computing an H statistic, which was used to determine whether the sums for the different AFSCs (columns) were significantly different (10:185).

Table 3-2

Ranked Responses to Question 56*
(Technicians Grouped by AFSC)

31	32	34	40	42	43	44
**						
R ₁ =	R ₂ =	R ₃ =	R ₄ =	R ₅ =	R ₆ =	R ₇ =

*Survey Question 56: T.O.s present adequate troubleshooting information for me to quickly correct malfunctions.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

**Each column contains the ranks of the various responses.

Since question 56 contained only five possible responses, a large number of tied rankings occurred. In case of tied rankings, each tied score was given the mean of the ranks for which it was tied. The computation of the H statistic to correct for ties is:

$$H = \frac{\frac{12}{N(N+1)} \sum_{j=1}^k \frac{R_j^2}{n_j} - 3(N+1)}{1 - \frac{\sum T}{N^3 - N}}$$

where

$T = t^3 - t$ (when t is the number of tied observations in a tied group of scores)

N = number of observations in all k samples together, that is, $N = \sum n_j$

$\sum T$ = directs one to sum over all groups of ties

R_j = sum of ranks in j^{th} sample (column) (10:185, 188).

Siegel states: "The effect of correcting for ties is to increase the value of H and thus to make the result more significant than it would have been if uncorrected [10:188]." H is distributed as a Chi Square with degrees of freedom equal to $(k-1)$, when the number of groups is greater than 3, and when the number of cases in each of the various groups is greater than five (10:185).

The null hypothesis was tested at the 0.05 level of significance using a one-tailed test. If the computed value of H was greater than the tabular value of χ^2 , with both values containing the same degrees of freedom and level of significance, the null hypothesis was rejected.

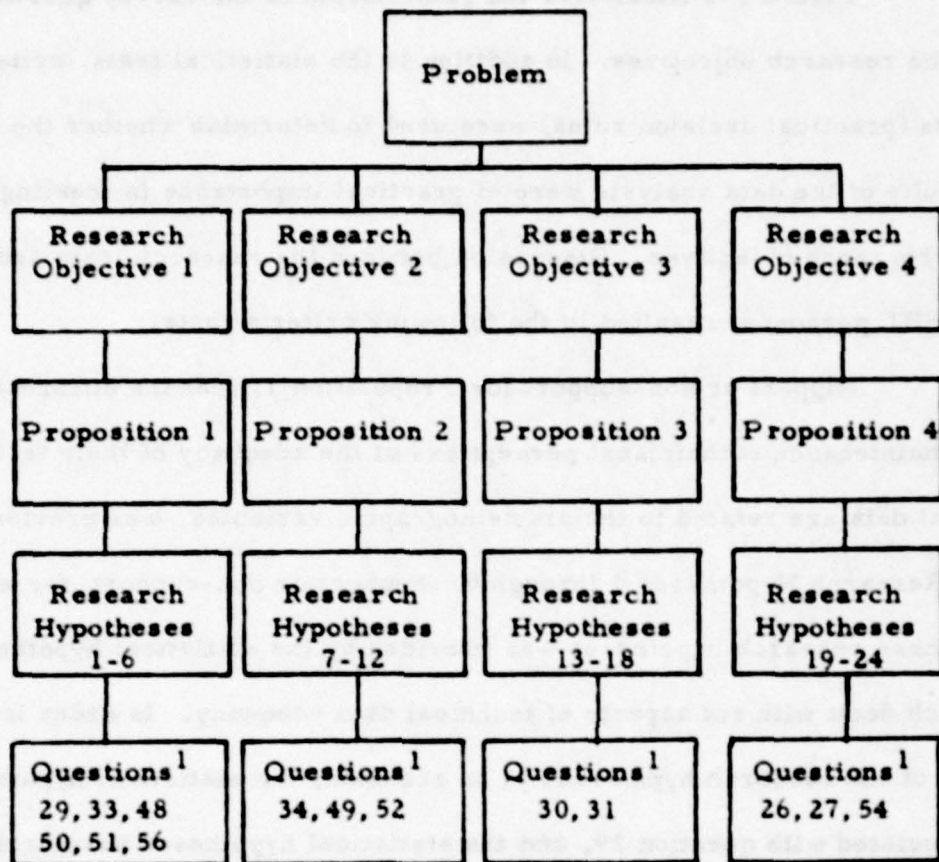
This test was applied to question 56 five more times in order to test for significant differences in responses for the other five demographic variables. Each of the other nine ordinal level questions were tested using this procedure.

Criteria Tests

Figure 3-1 illustrates the relationship of the survey questions to the research objectives. In addition to the statistical tests, criteria tests (practical decision rules) were used to determine whether the results of the data analysis were of practical importance in meeting the research objectives. Discussion between the research team and AFHRL personnel resulted in the following criteria tests.

Support or non-support for Proposition 1, that the differences in maintenance technicians' perceptions of the adequacy of their technical data are related to the six demographic variables, was provided by Research Hypotheses 1 through 6. Support or non-support for each of these research hypotheses was provided by the statistical hypotheses which dealt with six aspects of technical data adequacy. In order for one of the research hypotheses to be accepted, the statistical hypothesis associated with question 29, and the statistical hypotheses associated with at least three of the remaining five questions (33, 48, 50, 51, and 56) would have to be supported. Additionally, in order for the proposition to be supported, at least three of the research hypotheses would have to be accepted.

Support or non-support for Proposition 2, that the differences in maintenance technicians' perceptions of the level of writing of their technical data are related to the six demographic variables, was provided by Research Hypotheses 7 through 12. Support or non-support



¹ All of the questions listed in this block apply to each of the research hypotheses listed directly above the questions.

Figure 3-1
Relationship of Survey Questions to Research Objectives

for each of these research hypotheses was provided by the statistical hypotheses which dealt with three aspects of the level of writing of technical data. In order for one of the research hypotheses to be accepted, the statistical hypothesis associated with question 34, and at least one of the statistical hypotheses associated with questions 49 and 52 would have to be supported. Additionally, in order for the proposition to be supported, at least three of the research hypotheses would have to be supported.

Support or non-support for Proposition 3, that the differences in maintenance technicians' perceptions of the usage of their technical data are related to the six demographic variables, was provided by Research Hypotheses 13 through 18. Support or non-support for each of these research hypotheses was provided by the statistical hypotheses which dealt with two aspects of technical data usage. In order for one of the research hypotheses to be accepted, the statistical hypothesis associated with question 30 would have to be supported. Additionally, in order for the proposition to be supported, at least three of the research hypotheses would have to be accepted.

Support or non-support for Proposition 4, that the differences in maintenance technicians' perceptions of the frequency of usage of their technical data are related to the six demographic variables, was provided by Research Hypotheses 19 through 24. Support or non-support for each of these research hypotheses was provided by the

statistical hypotheses which dealt with three aspects of the frequency of usage of technical data. In order for one of the research hypotheses to be accepted, the statistical hypotheses associated with at least two of the three questions (26, 27, and 54) would have to be supported. Additionally, in order for the proposition to be supported, at least three of the research hypotheses would have to be accepted.

Summary List of Assumptions

1. The sample respondents were representative of Air Force maintenance technicians.
2. The response to the survey questions permitted the technicians to adequately describe their perceptions of technical data.

Summary List of Limitations

1. Some collaboration of the respondents in completing questionnaires may have occurred even though questionnaires were administered in an environment monitored by unit project officers (3:34).
2. The small number of respondents in some of the demographic categories⁷ of the six demographic variables necessitated deleting and/or combining some demographic categories for some or all of the statistical tests.

⁷A demographic category, also referred to as a category of a demographic variable, is a subgroup of a demographic variable. For example, for the purposes of this research the demographic categories of skill level are 3, 5, and 7 level.

CHAPTER IV

DATA ANALYSIS

Introduction

This chapter describes the analysis of the data used to evaluate the research propositions and hypotheses formulated to satisfy the research objectives.

Questionnaire Data

Of the 600 questionnaires that were mailed by Bunch, et al, 546 completed questionnaires were returned for an overall response rate of 91 percent (3:35). As the data from the 546 OPSCAN computer scored answer sheets were placed on a computer data file, an "11" (missing value) was recorded on the file whenever a respondent either failed to select a response, or marked a response that was not appropriate for a specific question. An example of an inappropriate response would be marking a response other than one, three, five, or seven for a technician's skill level. Appendix A contains the survey questionnaire and the distribution of total responses for each question.

Appendix B contains tables which display the distribution of technicians for each of the six demographic variables. The major

portion (79 percent) of respondents were technicians in the aircraft maintenance (33 percent), aircraft system maintenance (25 percent), and avionics system (21 percent) career fields (see Table B-1, Appendix B). The two next largest groups of technicians were in the missile maintenance (9 percent) and missile electronic maintenance (7 percent) career fields. Less than 1 percent of the respondents were in the intricate equipment maintenance career field. Since the respondents from this career field constituted such a small percentage of the sample, their responses were not included in the statistical tests dealing with differences in perceptions among technicians with different AFSCs. However, their responses were included in the statistical tests pertaining to the other demographic variables.

The majority, 56 percent, of the respondents were technicians possessing a five skill level (see Table B-2, Appendix B). Seven and three skill level personnel comprised 27 and 14 percent of the sample, respectively. Technicians possessing a one skill level constituted less than 1 percent of the sample; therefore, their responses were not included in the statistical tests dealing with differences in perceptions among technicians with different skill levels. However, their responses were included in the statistical tests pertaining to the other demographic variables.

The sample contained a wide distribution of pay grades (see Table B-3, Appendix B). The majority of respondents, however, were in the three middle pay grades: E3 (16 percent), E4 (23 percent), and E5 (16 percent). Only 11 percent of the technicians were in the two lowest pay grades (E1, 1 percent; E2, 10 percent), and less than 7 percent of the respondents were in the two highest pay grades (E6, 5 percent; E7, 1 percent).

The majority, 67 percent, of the respondents possessed less than 6 years of maintenance experience (see Table B-4, Appendix B). The percentage of respondents in each of the remaining categories of maintenance experience, 6 through 16 years or more, ranged from 4 to 8 percent.

Approximately 63 percent of the respondents had less than 2 years of supervisory experience (see Table B-5, Appendix B). The percentage of respondents in each of the remaining categories of supervisory experience, 2 through 16 years or more, ranged from 1 to 10 percent.

An equal percentage (18) of the respondents were assigned to the C-130, B-52/KC-135, and C-5 weapon systems (see Table B-6, Appendix B). Technicians assigned to the Minuteman III, F-15, and RF-4 weapon systems comprised 16, 15, and 14 percent of the respondents, respectively.

Data Presentation Format

The presentation of the data analysis is in numerical order by research proposition. For each proposition there is a listing of the pertinent research and statistical hypotheses. Following this listing is an analysis section which contains a proposition summary table and a discussion of the results of the statistical tests. The proposition summary table displays the significance levels of the proposition's statistical hypotheses. Each statistical hypothesis in the table is cross-referenced by the T.O. aspect tested (rows), and by the research hypothesis and demographic variable (columns), pertaining to the statistical hypothesis. Additionally, the proposition summary table indicates which research hypotheses are accepted, and whether the proposition is accepted.

For a more detailed data presentation the reader should consult Appendices C through F.

Proposition 1

Maintenance technician's perceptions of the adequacy of their technical data are related to six demographic variables (i.e., AFSC, skill level, pay grade, maintenance experience, supervisory experience, and weapon system).

Research Hypothesis 1

Maintenance technicians' perceptions of the adequacy of their technical data are related to their AFSC.

Statistical Hypothesis 1-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their AFSC.

Statistical Hypothesis 1-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their AFSC.

Statistical Hypothesis 1-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their AFSC.

Statistical Hypothesis 1-4

Maintenance technicians' perceptions of whether their technical data are too big and thick are related to their AFSC.

Statistical Hypothesis 1-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately, but fail to provide sufficient information as things get more complicated are related to their AFSC.

Statistical Hypothesis 1-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their AFSC.

Research Hypothesis 2

Maintenance technicians' perceptions of the adequacy of their technical data are related to their skill level.

Statistical Hypothesis 2-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their skill level.

Statistical Hypothesis 2-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their skill level.

Statistical Hypothesis 2-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their skill level.

Statistical Hypothesis 2-4

Maintenance technicians' perceptions of whether their technical data are too big and thick are related to their skill level.

Statistical Hypothesis 2-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately, but fail to provide sufficient information as things get more complicated are related to their skill level.

Statistical Hypothesis 2-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their skill level.

Research Hypothesis 3

Maintenance technicians' perceptions of the adequacy

of their technical data are related to their pay grade.

Statistical Hypothesis 3-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their pay grade.

Statistical Hypothesis 3-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their pay grade.

Statistical Hypothesis 3-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their pay grade.

Statistical Hypothesis 3-4

Maintenance technicians' perceptions of whether their technical data are too big and thick are related to their pay grade.

Statistical Hypothesis 3-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately, but fail to provide sufficient information as things get more complicated are related to their pay grade.

Statistical Hypothesis 3-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their pay grade.

Research Hypothesis 4

Maintenance technicians' perceptions of the adequacy

of their technical data are related to their maintenance experience.

Statistical Hypothesis 4-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their maintenance experience.

Statistical Hypothesis 4-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their maintenance experience.

Statistical Hypothesis 4-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their maintenance experience.

Statistical Hypothesis 4-4

Maintenance technicians' perceptions of whether their technical data are too big and thick are related to their maintenance experience.

Statistical Hypothesis 4-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately, but fail to provide sufficient information as things get more complicated are related to their maintenance experience.

Statistical Hypothesis 4-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their maintenance experience.

Research Hypothesis 5

Maintenance technicians' perceptions of the adequacy of their technical data are related to their supervisory experience.

Statistical Hypothesis 5-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their supervisory experience.

Statistical Hypothesis 5-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their supervisory experience.

Statistical Hypothesis 5-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their supervisory experience.

Statistical Hypothesis 5-4

Maintenance technicians' perceptions of whether their technical data are too big and thick are related to their supervisory experience.

Statistical Hypothesis 5-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately, but fail to provide sufficient information as things get more complicated are related to their supervisory experience.

Statistical Hypothesis 5-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of

troubleshooting information to quickly correct malfunctions are related to their supervisory experience.

Research Hypothesis 6

Maintenance technicians' perceptions of the adequacy of their technical data are related to their weapon system.

Statistical Hypothesis 6-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their weapon system.

Statistical Hypothesis 6-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their weapon system.

Statistical Hypothesis 6-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their weapon system.

Statistical Hypothesis 6-4

Maintenance technicians' perceptions of whether their technical data are too big and thick are related to their weapon system.

Statistical Hypothesis 6-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately, but fail to provide sufficient information as things get more complicated are related to their weapon system.

Statistical Hypothesis 6-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their weapon system.

Analysis

Table 4-1 contains the results (i. e. p-values) of testing the statistical hypotheses associated with Proposition 1. As indicated in this table, AFSC was the only demographic variable for which maintenance technicians' perceptions of the currency, accuracy, and compatibility of their technical data were significantly different. Although nearly 67 percent of the technicians unequivocally stated that their technical data were current, accurate, and compatible with the equipment maintained, the "mean ranks"⁸ of the responses generated as a byproduct of the Kruskal-Wallis test indicated that the missile and missile electronic maintenance technicians considered their technical data to be the most adequate, and the avionic system and training devices maintenance technicians considered their technical data to be the least adequate in this respect (see Table C1-1, Appendix C).

"Value as a training device" and "difficulty in finding needed information" were two aspects of technical orders for which maintenance technicians' perceptions were not significantly different for

⁸See Data Presentation Format section of Appendix C for an explanation of "mean ranks."

Table 4-1

Proposition 1 Summary Table: Significance Levels of the
Statistical Test by T.O. Aspect Tested and by
Research Hypothesis

T.O. Aspect Tested	Research Hypothesis					
	1 (AFSC) ^a	2 (Skill Level)	3 (Pay Grade)	4 (Maint. Exper.)	5 (Super. Exper.)	6 (Weapon System)
Up-to-date, Accurate, Com- patible	.001** (1-1) ^b	.175 (2-1)	.416 (3-1)	.510 (4-1)	.560 (5-1)	.478 (6-1)
Value as a Training Device	.573 (1-2)	.398 (2-2)	.844 (3-2)	.062 (4-2)	.364 (5-2)	.429 (6-2)
Difficulty in Finding Needed Information	.115 (1-3)	.703 (2-3)	.804 (3-3)	.835 (4-3)	.748 (5-3)	.303 (6-3)
Size: Too Big and Thick	.014* (1-4)	.009** (2-4)	.003** (3-4)	.082 (4-4)	.003** (5-4)	.018* (6-4)
Explanation: Simple and Complex	.024* (1-5)	.362 (2-5)	.054 (3-5)	.010** (4-5)	.020* (5-5)	.454 (6-5)
Value for Troubleshooting Malfunction	.010** (1-6)	.257 (2-6)	.057 (3-6)	.214 (4-6)	.024* (5-6)	.941 (6-6)
Research Hypothesis Accepted?	Yes	No	No	No	No	No
Proposition 1 Accepted?	No					

^aIndicates the Demographic Variable Associated with the Research Hypothesis.

^bIndicates the Associated Statistical Hypothesis.

any of the six demographic variables.

Approximately 39 percent of the technicians indicated that their technical data were "too big and thick." Yet, technicians' perceptions regarding technical data size were significantly different for all the demographic variables except maintenance experience. The demographic categories that expressed the strongest sentiment toward the bulkiness of their technical data were: (1) aircraft and missile maintenance career fields, (2) 3 and 5 skill levels, (3) E1 and E2 pay grades, (4) 12-14 years of supervisory experience, and (5) C-130 weapon system. In contrast, the demographic categories that least agreed with the statement that their technical data are "too big and thick" were: (1) training devices career field, (2) 7 skill level, (3) E5 and E6 pay grades, (4) 8-10 years and greater than 16 years of supervisory experience, and (5) B-52/KC-135 weapon systems (see Table C1-4, C2-4, C3-4, C5-4, and C6-4, Appendix C).

Maintenance technicians' perceptions of whether T.O.s explain the simpler procedures adequately, but fail to provide sufficient information as procedures get more complicated were significantly different for three demographic variables: AFSC, maintenance experience, and supervisory experience. A fourth variable, pay grade, came close to yielding significant differences ($p = .054$).

The demographic categories of AFSC, maintenance experience, and supervisory experience that expressed the strongest

agreement with the statement "T.O.s explain the simpler things adequately, but fail to provide sufficient information as things get more complicated" were: (1) avionic system maintenance, (2) 6-8 years of maintenance experience, and (3) 2-4 years or 4-6 years of supervisory experience. The demographic categories of the same three demographic variables that expressed the least agreement with the above statement were: (1) training devices career field, (2) 10-12 years, 12-14 years, and greater than 16 years of maintenance experience, and (3) 10-12 years of supervisory experience (see Tables C1-5, C4-5, and C5-5, Appendix C).

Unfortunately, the wording of the above statement was such that it is unclear whether technicians disagreed with the statement because the T.O.s do not explain the simpler procedures adequately, or because they do explain the more complicated procedures adequately.

Overall, only 27 percent of the technicians felt that the troubleshooting information in their technical data was adequate, and their perceptions of the adequacy of their technical data for troubleshooting (i.e., quickly identifying and correcting malfunctions) differed significantly by AFSC and supervisory experience. A third demographic variable, pay grade, came close to yielding significant differences ($p = .057$).

Technicians in the aircraft system, aircraft, and missile maintenance career fields expressed the greatest satisfaction with the adequacy of their troubleshooting information, while technicians in the training devices career field displayed the greatest dissatisfaction with this aspect of their technical data (see Table C1-6, Appendix C).

Maintenance technicians with 10-12 and 14-16 years of supervisory experience considered their technical data to be the most adequate for troubleshooting malfunctions, while technicians with 2-4, 6-8, and 12-14 years of supervisory experience felt that their technical data was the least adequate in this respect (see Table C5-6, Appendix C).

The criteria test, discussed in Chapter III, required acceptance of three of the six research hypotheses in order for Proposition 1 to be accepted. As indicated in Table 4-1, Research Hypothesis 1 (AFSC) is the only research hypothesis associated with Proposition 1 which was accepted. Consequently, there is insufficient evidence to conclude that maintenance technicians' perceptions of the adequacy of their technical data are related to the six demographic variables.

Proposition 2

Maintenance technicians' perceptions of the level of writing of their technical data are related to six demographic variables (i. e., AFSC, skill level, pay grade, maintenance

experience, supervisory experience, and weapon system).

Research Hypothesis 7

Maintenance technicians' perceptions of the level of writing of their technical data are related to their AFSC.

Statistical Hypothesis 7-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their AFSC.

Statistical Hypothesis 7-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their AFSC.

Statistical Hypothesis 7-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their AFSC.

Research Hypothesis 8

Maintenance technicians' perceptions of the level of writing of their technical data are related to their skill level.

Statistical Hypothesis 8-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their skill level.

Statistical Hypothesis 8-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their skill level.

Statistical Hypothesis 8-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their skill level.

Research Hypothesis 9

Maintenance technicians' perceptions of the level of writing of their technical data are related to their pay grade.

Statistical Hypothesis 9-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their pay grade.

Statistical Hypothesis 9-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their pay grade.

Statistical Hypothesis 9-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their pay grade.

Research Hypothesis 10

Maintenance technicians' perceptions of the level of writing of their technical data are related to their maintenance experience.

Statistical Hypothesis 10-1

Maintenance technicians' perceptions of the level of understanding for which their technical data

are written are related to their maintenance experience.

Statistical Hypothesis 10-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their maintenance experience.

Statistical Hypothesis 10-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their maintenance experience.

Research Hypothesis 11

Maintenance technicians' perceptions of the level of writing of their technical data are related to their supervisory experience.

Statistical Hypothesis 11-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their supervisory experience.

Statistical Hypothesis 11-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their supervisory experience.

Statistical Hypothesis 11-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their supervisory experience.

Research Hypothesis 12

Maintenance technicians' perceptions of the level of

writing of their technical data are related to their weapon system.

Statistical Hypothesis 12-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their weapon system.

Statistical Hypothesis 12-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their weapon system.

Statistical Hypothesis 12-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their weapon system.

Analysis

Table 4-2 illustrates the significance levels of the statistical hypotheses associated with Proposition 2. Overall, approximately 40 percent of the technicians reported that T.O.s were written for the level of understanding of a five level technician, while 35 percent indicated that T.O.s were written at a level of understanding for all skill levels. As shown in Table 4-2, however, the perceptions of maintenance technicians regarding the level of understanding for which their technical data were written were significantly different for each of the six demographic variables. Table 4-3 contains, by demographic category and demographic variable, the most frequently selected

Table 4-2

Proposition 2 Summary Table: Significance Levels of the
Statistical Tests by T.O. Aspect Tested and by
Research Hypothesis

T. O. Aspect Tested	Research Hypothesis					
	7 (AFSC) ^a	8 (Skill Level)	9 (Pay Grade)	10 (Maint. Exper.)	11 (Super. Exper.)	12 (Weapon System)
Level of Understanding Written for	.002 ^{a*} (7-1) ^b	.009 ^{a*} (8-1)	.007 ^{a*} (9-1)	.006 ^{a*} (10-1)	.048 ^{a*} (11-1)	.009 ^{a*} (12-1)
Too Complicated to Understand	.302 (7-2)	.076 (8-2)	.304 (9-2)	.854 (10-2)	.845 (11-2)	.464 (12-2)
Leave Theory Out	.001 ^{a*} (7-3)	.224 (8-3)	.855 (9-3)	.468 (10-3)	.678 (11-3)	.121 (12-3)
Research Hypothesis Accepted?	Yes	No	No	No	No	No
Proposition 2 Accepted?	No					

^aIndicates the Demographic Variable associated with the Research Hypothesis.

^bIndicates the associated Statistical Hypothesis.

Table 4-3

Most Frequent Responses by Demographic Categories to
Question Regarding the Level of Understanding for
Which T.O.s Are Written

Demographic Variable	Level of Understanding T.O. Written for	
	5 Skill Level	All Skill Levels
AFSC	Missile Electronic Avionics System	Aircraft System Aircraft Maintenance
Skill Level	7	3, 5
Pay Grade	E4, E5 E6, E7	E1, E2 E3
Maintenance Experience	2-4 yrs 6-10 yrs 10-14 yrs Greater than 14 yrs	Less than 2 yrs 4-6 yrs
Supervisory Experience	2-4 yrs 4-6 yrs 6-10 yrs Greater than 10 yrs	Less than 2 yrs
Weapon System	M-III RF-4 F-15 B-52/KC-135	C-130 C-5

response to the question: For what level of understanding do you feel T.O.s are written? As illustrated in the table, technicians in each of the demographic categories most frequently chose either "5 skill level" or "all skill levels" as the response to this question.

The demographic categories most frequently stating that T.O.s were written for the level of understanding of a five level technician were: (1) missile electronic, avionic system, and missile maintenance career fields (37, 48, 47 percent, respectively), (2) 7 skill level (50 percent), (3) E4 or above pay grades (response rates ranged from 38 to 58 percent), (4) 2-4 years and over 6 years of maintenance experience (response rates ranged from 45 to 53 percent), (5) greater than 2 years of supervisory experience (response rates ranged from 39 to 51 percent), and (6) Minuteman III (40 percent), RF-4 (50 percent), and F-15 (47 percent) weapon systems (see Tables D7-1, D8-1, D9-1, D10-1, D11-1, and D12-1, Appendix D).

The demographic categories most frequently indicating that T.O.s were written for the level of understanding of all skill levels were: (1) aircraft system and aircraft maintenance career fields (38 and 40 percent, respectively), (2) 3 and 5 skill levels (39 and 38 percent, respectively), (3) E1/E2 and E3 pay grades (41 and 44 percent, respectively), (4) less than 2 years and 4-6 years of maintenance experience (43 and 36 percent, respectively), (5) less than 2 years of supervisory experience (40 percent), and (6) C-5 and C-130 weapon systems (40 percent in each case). Technicians associated with the B-52/KC-135 weapon systems were equally divided between the "5 skill level" and "all skill levels" responses with 33 percent of the technicians selecting each of these responses (see Tables D7-1,

D8-1, D9-1, D10-1, D11-1, and D12-1, Appendix D).

Maintenance technicians' perceptions of whether technical data are "too complicated to understand" were not significantly different for any of the six demographic variables tested.

AFSC was the only demographic variable for which technicians' perceptions of whether theory should be left out of T.O.s were significantly different. Overall, only 22 percent of the technicians felt that the theory should be taken out of technical data. The "mean ranks" of the responses indicate that avionic system and training devices maintenance technicians were the least in favor of leaving theory out of technical data, while the aircraft and missile maintenance technicians were the most in favor of leaving the theory out (see Table D7-3, Appendix D).

The criteria test, discussed in Chapter III, required acceptance of three of the six research hypotheses in order for Proposition 2 to be accepted. As indicated in Table 4-2, Research Hypothesis 7 (AFSC) is the only research hypothesis associated with Proposition 2 which was accepted. Consequently, there is insufficient evidence to conclude that maintenance technicians' perceptions of the level of writing of their technical data are related to the six demographic variables.

Proposition 3

Maintenance technicians' perceptions of the usage of their

technical data are related to six demographic variables (i. e. AFSC, skill level, pay grade, maintenance experience, supervisory experience, and weapon system).

Research Hypothesis 13

Maintenance technicians' perceptions of the usage of their technical data are related to their AFSC.

Statistical Hypothesis 13-1

Maintenance technicians' perceptions of the primary purpose for which they use their technical data are related to their AFSC.

Statistical Hypothesis 13-2

Maintenance technicians' perceptions of the secondary purpose for which they use their technical data are related to their AFSC.

Research Hypothesis 14

Maintenance technicians' perceptions of the usage of their technical data are related to their skill level.

Statistical Hypothesis 14-1

Maintenance technicians' perceptions of the primary purpose for which they use their technical data are related to their skill level.

Statistical Hypothesis 14-2

Maintenance technicians' perceptions of the secondary purpose for which they use their technical data are related to their skill level.

Research Hypothesis 15

Maintenance technicians' perceptions of the usage of

their technical data are related to their pay grade.

Statistical Hypothesis 15-1

Maintenance technicians' perceptions of the primary purpose for which they use their technical data are related to their pay grade.

Statistical Hypothesis 15-2

Maintenance technicians' perceptions of the secondary purpose for which they use their technical data are related to their pay grade.

Research Hypothesis 16

Maintenance technicians' perceptions of the usage of their technical data are related to their maintenance experience.

Statistical Hypothesis 16-1

Maintenance technicians' perceptions of the primary purpose for which they use their technical data are related to their maintenance experience.

Statistical Hypothesis 16-2

Maintenance technicians' perceptions of the secondary purpose for which they use their technical data are related to their maintenance experience.

Research Hypothesis 17

Maintenance technicians' perceptions of the usage of their technical data are related to their supervisory experience.

Statistical Hypothesis 17-1

Maintenance technicians' perceptions of the primary purpose for which they use their technical data are related to their supervisory experience.

Statistical Hypothesis 17-2

Maintenance technicians' perceptions of the secondary purpose for which they use their technical data are related to their supervisory experience.

Research Hypothesis 18

Maintenance technicians' perceptions of the usage of their technical data are related to their weapon system.

Statistical Hypothesis 18-1

Maintenance technicians' perceptions of the primary purpose for which they use their technical data are related to their weapon system.

Statistical Hypothesis 18-2

Maintenance technicians' perceptions of the secondary purpose for which they use their technical data are related to their weapon system.

Analysis

Table 4-4 contains the significance levels of the statistical hypotheses associated with Proposition 3. The largest percentage of technicians in all of the demographic categories of the six demographic variables selected the response "step-by-step performance (how to do the job)" as the primary purpose for which their T.O.s are used. However, the selection of the second most frequently chosen response

Table 4-4

Proposition 3 Summary Table: Significance Levels of the Statistical Tests by T.O. Aspect Tested and by Research Hypothesis

T.O. Aspect Tested	Research Hypothesis					
	13 (AFSC) ^a	14 (Skill Level)	15 (Pay Grade)	16 (Maint. Exper.)	17 (Super. Exper.)	18 (Weapon System)
Primary Purpose of the T.O. ^a	$<.001^{**}$ (13-1) ^b	$<.001^{**}$ (14-1)	.020 ^a (15-1)	.150 (16-1)	.295 (17-1)	.001 ^{**} (18-1)
Secondary Purpose of T.O. ^a	$<.001^{**}$ (13-2)	.004 ^{**} (14-2)	.067 (15-2)	.219 (16-2)	.427 (17-2)	.003 ^{**} (18-2)
Research Hypothesis Accepted?	Yes	Yes	Yes	No	No	Yes
Proposition 3 Accepted?	Yes					

^aIndicates the Demographic Variable Associated with the Research Hypothesis.

^bIndicates the Associated Statistical Hypothesis.

varied widely by demographic category. Consequently, maintenance technicians' perceptions of the primary purpose for which their T.O.s are used differed significantly for four demographic variables: AFSC, skill level, pay grade, and weapon system. For these four demographic variables, Table 4-5 contains by demographic category and demographic variable the second most frequently selected response to the question: For what primary purpose do you use T.O.s?

Table 4-5

Summary of the Second Most Frequently Selected Response
for the Primary Purpose of T.O.s by
Demographic Categories

Demographic Variable	Response		
	Training and Familiarization	Reference	Troubleshooting
AFSC	44	43, 31 (tied)*	32, 31 (tied)
Skill Level	3	5, 7	
Pay Grade	E1/E2	E4, E6/E7	E3/E5
Weapon System	MIII	C-130, C-5	RF-4, F-15 B-52/KC-135

*The (tied) indicates that for the 31XXX AFSC the "Reference" and "Troubleshooting" responses were selected by an equal percentage of technicians.

As indicated in Table 4-5, either "training and familiarization," "reference (to find out how it works or where it is located)," or

"troubleshooting" was the second most frequently chosen response⁹ by all of the demographic categories, except for aircraft system maintenance (AFSC 42XXX).

Although the largest percentage of technicians in all the demographic categories of the six demographic variables selected "step-by-step performance" as the primary purpose for which their technical data are used, there were large differences among the demographic variables in the percentage of technicians selecting a response other than "step-by-step performance." For example, within the demographic variables of AFSC and weapon system there were large differences in the percentage of technicians selecting "troubleshooting" as the primary purpose for which their T.O.s are used. Thirty-one percent of the avionic system maintenance (32XXX) technicians selected this response, as opposed to only 5 percent of the aircraft maintenance (43XXX) and 4 percent of the missile maintenance (44XXX) technicians. Similarly, 21, 22, and 24 percent of the technicians associated with the B-52/KC-135, RF-4, and F-15 weapon systems, respectively, selected "troubleshooting" as the primary purpose for which T.O.s are used, while only 10 percent or less of the technicians in each of the C-130, Minuteman III, and C-5 weapon systems chose this response. Within the demographic variables of

⁹The responses "training and familiarization," "reference," and "troubleshooting" were chosen by approximately 17, 15, and 13 percent of the technicians, respectively.

skill level and pay grade, there were large differences in the percentage of technicians selecting "training and familiarization" as the primary purpose of their technical data. Twenty-nine percent of the 3 level technicians selected this response, as opposed to only 9 percent of the 5 level, and 12 percent of the 7 level technicians. Thirty percent of the technicians in the E1/E2 pay grade category indicated that "training and familiarization" was the primary purpose for which technical data are used, while only 14 percent or less of the technicians in the other pay grade categories selected this response (see Tables E13-1, E14-1, E15-1, and E-18-1, Appendix E).

Maintenance technicians' perceptions of the secondary purpose for which T.O.s are used differed significantly for three of the six demographic variables: AFSC, skill level, and weapon system. Unlike the primary purpose for T.O.s, the largest percentage of technicians in each of the demographic categories for these three demographic variables did not select the same response as the secondary purpose for the use of T.O.s. Table 4-6 indicates by demographic category the most frequently selected response to the question: For what secondary purpose do you use T.O.s? The table indicates that either "training and familiarization," "reference," "step-by-step performance," or "troubleshooting" was the most frequently chosen response by each of the demographic categories of AFSC, skill level, and weapon system. These four responses were

Table 4-6

**Summary of the Most Frequently Selected Response
for the Secondary Purpose of T.O.s by
Demographic Category**

Demographic Variable	Response			
	Training and Familiarization	Reference	Step-by-Step Performance	Trouble-shooting
AFSC	43, 42 (tied)*		42 (tied)	31, 32, 44
Skill Level	7	3		5
Weapon System	B-52/KC-135 C-5, C-130 (tied)	F-15 (tied) C-130 (tied)	C-130 (tied)	F-15 (tied) MHI

*(Tied) indicates that the two or three responses with the same demographic category listed under them were selected by an equal percentage of technicians.

selected by approximately 20, 18, 14, and 18 percent of the technicians, respectively (see Table E13-2, Appendix E).

Maintenance technicians in the aircraft maintenance (43XXX) career field most frequently selected (28 percent) "training and familiarization" as the secondary purpose for their T.O.s, while technicians in the missile electronic (31XXX), avionic system (32XXX) and missile maintenance (44XXX) career fields most frequently indicated (22, 26, 27 percent, respectively) that "troubleshooting" was the secondary purpose for their technical data. An equal percentage (20 percent) of technicians in the aircraft system (42XXX) career field selected both "training and familiarization" and "step-by-step

performance (how to do the job)" (see Table E13-2, Appendix E).

The largest percentage of technicians in each of the three skill levels selected a different secondary purpose for their T.O.s. "Training and familiarization" was the purpose chosen by 23 percent of the 7 level technicians, while 22 percent of the 3 level technicians selected "reference" and 24 percent of the 5 level technicians selected "troubleshooting" as the secondary purpose of their technical data (see Table E-14-2, Appendix E).

Maintenance technicians associated with the B-52/KC-135 and C-5 weapon systems most frequently selected (29 and 27 percent, respectively) "training and familiarization," while technicians associated with the Minuteman III weapon system most frequently chose (17 percent) "troubleshooting" as the secondary purpose for their technical data. An equal percentage (18 percent) of technicians in the C-130 weapon system selected "training and familiarization," "reference," and "step-by-step performance" as the secondary purpose for which their technical data are used. Additionally, an equal percentage (21 percent) of technicians associated with the F-15 weapon system selected "reference" and "troubleshooting" as the secondary purpose for their technical data (see Table E18-2, Appendix E).

The criteria test, discussed in Chapter III, required acceptance of three of the six research hypotheses in order for Proposition 3 to be accepted. As indicated in Table 4-4, four research hypotheses

(13/AFSC, 14/skill level, 15/pay grade, and 18/weapon system) are accepted. Consequently, there is sufficient evidence to conclude that maintenance technicians' perceptions of the usage of their technical data are related to the six demographic variables.

Proposition 4

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to six demographic variables (AFSC, skill level, pay grade, maintenance experience, supervisory experience, and weapon system).

Research Hypothesis 19

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their AFSC.

Statistical Hypothesis 19-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their AFSC.

Statistical Hypothesis 19-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their AFSC.

Statistical Hypothesis 19-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their job are related to their AFSC.

Research Hypothesis 20

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their skill level.

Statistical Hypothesis 20-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their skill level.

Statistical Hypothesis 20-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their skill level.

Statistical Hypothesis 20-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their jobs are related to their skill level.

Research Hypothesis 21

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their pay grade.

Statistical Hypothesis 21-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to pay grade.

Statistical Hypothesis 21-2

Maintenance technicians' perceptions of to what

extent they actually use the T.O. at their work station as a performance aid are related to their pay grade.

Statistical Hypothesis 21-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their jobs are related to their pay grade.

Research Hypothesis 22

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their maintenance experience.

Statistical Hypothesis 22-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their maintenance experience.

Statistical Hypothesis 22-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their maintenance experience.

Statistical Hypothesis 22-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their jobs are related to their maintenance experience.

Research Hypothesis 23

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their supervisory experience.

Statistical Hypothesis 23-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their supervisory experience.

Statistical Hypothesis 23-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their supervisory experience.

Research Hypothesis 24

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their weapon system.

Statistical Hypothesis 24-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their weapon system.

Statistical Hypothesis 24-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their weapon system.

Statistical Hypothesis 24-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their jobs are related to their weapon system.

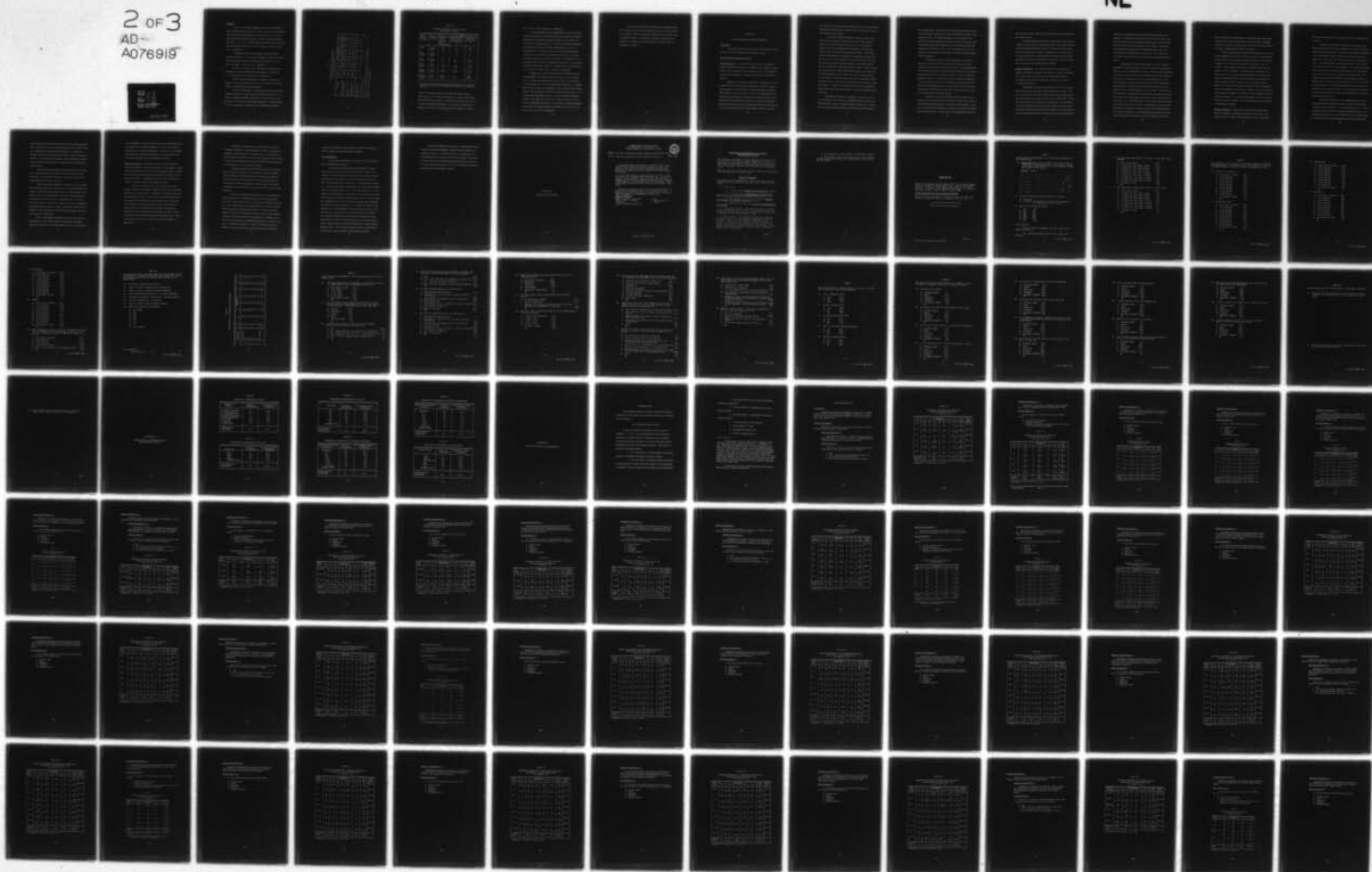
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AN ANALYSIS OF THE RELATIONSHIPS BETWEEN DEMOGRAPHIC FACTORS AN--ETC(U)
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Analysis

Table 4-7 contains the significance levels of the statistical tests associated with Proposition 4. Overall, 23 percent of the maintenance technicians indicated that they refer to their T.O.s 21 to 50 times during the average work week. Another 21 percent stated that they refer to T.O.s 5 to 10 times during the average week, and 20 percent said that they refer to T.O.s 11 to 20 times a week (see Table F19-1, Appendix F).

Forty-six percent of the respondents indicated that they frequently use their T.O.s at their work stations. Twenty-two percent of the respondents, however, stated that they seldom use T.O.s at their work station (see Table F19-2, Appendix F).

Seventy-four percent of the maintenance technicians either disagreed or strongly disagreed with the statement, "I rarely use T.O.s in doing my job" (see Table F19-3, Appendix F).

Table 4-8 lists the demographic categories of each demographic variable that indicated the most or least usage of T.O.s with respect to the three aspects of Proposition 4.

As Table 4-8 indicates, the demographic categories that indicated they refer to T.O.s the least in an average work week are: (1) missile maintenance (44XXX) career field, (2) 5 skill level, (3) E2 pay grade, (4) 2-4 years of maintenance experience, (5) greater than 16 years of supervisory experience, and (6) Minuteman III weapon

Table 4-7

Proposition 4 Summary Table: Significant Levels of the
Statistical Tests by T.O. Aspect Tested and
by Research Hypothesis

T.O. Aspect Tested	Research Hypothesis					
	19 (AFSC) ^a	20 (Skill Level)	21 (Pay Grade)	22 (Maint. Exper.)	23 (Super. Exper.)	24 Weapon System
Number of Times Refer to T.O. in a Week	.001** (19-1) ^b	.006** (20-1)	.043* (21-1)	.001** (22-1)	.008** (23-1)	.001** (24-1)
Use of T.O. at the Work Station	.390 (19-2)	.054 (20-2)	.002** (21-2)	.028* (22-2)	.174 (23-2)	.027* (24-2)
T.O. Rarely Referred to in Doing Job	.001** (19-3)	<.001** (20-3)	.003** (21-3)	<.001** (22-3)	.003** (23-3)	.027* (24-3)
Research Hypothesis Accepted?	Yes	Yes	Yes	Yes	Yes	Yes
Proposition 4 Accepted?	Yes					

^aIndicates the Demographic Variable Associated with the Research Hypothesis.

^bIndicates the Associated Statistical Hypothesis.

Table 4-8

Frequency of Technical Order Usage by
Demographic Category

Demo-graphic Variable	Amount of Reference to T.O.	T.O. Aspect		
		Number of Times Refer to T.O. in Average Wk.	Extent Use T.O. at Work Station as Performance Aid	Refer to T.O. in Doing the Job
AFSC	Least	44	44	44
	Most	32	31	32
Skill Level	Least	5	5*	3
	Most	7	7*	7
Pay Grade	Least	E2	E7	E2
	Most	E6	E1	E6
Maint. Exper.	Least	2-4	2-4	2-4
	Most	10-12	12-14	12-14
Super. Exper.	Least	GT16	GT16*	GT16
	Most	8-10	6-8*	8-10
Weapon System	Least	MIII	C-5	MIII
	Most	RF-4	F-15	RF-4

*For skill level and maintenance experience there was no significant difference in technicians' perceptions with regard to this aspect of the T.O.

system. In contrast to these, the demographic categories that referred to T.O.s the most in a week are: (1) avionics system maintenance (32XXX) career field, (2) 7 skill level, (3) E6 pay grade, (4) 10-12 years of maintenance experience, (5) 8-10 years of supervisory experience, and (6) RF-4 weapon system (see Tables F19-1, F20-1,

F21-1, F22-1, F23-1, and F24-1, Appendix F).

The table indicates that the demographic categories that indicated they use the T.O.s the least at their work station as a performance aid are: (1) missile maintenance (44XXX) career field, (2) 5 skill level, (3) E7 pay grade, (4) 2-4 years of maintenance experience, (5) greater than 16 years of supervisory experience, and (6) C-5 weapon system. In contrast to these, the categories that reported using their T.O.s at their work stations the most are: (1) missile electronic maintenance (31XXX) career field, (2) 7 skill level, (3) E1 pay grade, (4) 12-14 years of maintenance experience, (5) 6-8 years of supervisory experience, and (6) F-15 weapon system (see Tables F19-2, F20-2, F21-2, F22-2, F23-2, and F24-2, Appendix F).

Additionally, Table 4-8 indicates that the categories of the six demographic variables that stated they refer to T.O.s the least are: (1) missile maintenance (44XXX) career field, (2) 3 skill level, (3) E2 pay grade, (4) 2-4 years of maintenance experience, (5) greater than 16 years of supervisory experience, and (6) Minuteman III weapon system. The demographic categories that indicated they refer to T.O.s the most while doing their jobs are: (1) avionic system maintenance (32XXX) career field, (2) 7 skill level, (3) E6 pay grade, (4) 12-14 years of maintenance experience, (5) 8-10 years of supervisory experience, and (6) RF-4 weapon system (see Tables 19-3, F20-3, F21-3, F22-3, F23-3, and F24-3, Appendix F).

The criteria test, discussed in Chapter III, required acceptance of three of the six research hypotheses in order for Proposition 4 to be accepted. Since all six research hypotheses are accepted, there is sufficient evidence to conclude that maintenance technicians' perceptions of the usage of their technical data are related to the six demographic variables.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the conclusions of this research effort, and offers some recommendations for further research.

Research Objectives and Conclusions

Research objective 1. This research objective was to determine whether maintenance technicians' perceptions of the adequacy of their technical data are related to six demographic factors. Proposition 1 and Research Hypotheses 1 through 6 were used to accomplish this objective.

Maintenance technicians' perceptions of the adequacy of their technical data were found to differ significantly by AFSC. Although approximately 93.0 percent of the technicians generally agreed that their technical data were current, accurate, and compatible with the equipment they maintained, technicians with different AFSCs had significantly different perceptions of this aspect of their technical data. Missile and missile electronic maintenance technicians were the most favorably impressed with their technical data's currency, accuracy,

and compatibility with equipment maintained, while avionic system and training devices technicians considered their technical data to be the least adequate in this respect.

Aircraft and missile maintenance technicians reported the most favorable perceptions of their technical data with respect to adequacy for troubleshooting malfunctions, while here again the avionics system and training devices technicians considered their technical data to be the least adequate in this respect. The avionic system and training devices technicians' dissatisfaction with the currency, accuracy, and compatibility of their technical data, and with the adequacy of troubleshooting information in their technical data appears to indicate that improvements in the technical orders for these two career fields have lagged behind technical data improvements for the other maintenance career fields, and certainly indicate that the current technical orders do not meet the needs of technicians in these two career fields as well as they meet the needs of technicians in other career fields. Consequently, efforts should be made to upgrade and improve the technical data used by avionic system and training devices technicians.

Maintenance technicians' perceptions of whether T.O.s are "too big and thick" were found to be significantly different for each of the demographic variables, except maintenance experience. Training devices technicians encountered the least difficulty with this aspect of

their technical data, while both aircraft and missile maintenance technicians expressed the greatest concern regarding the bulkiness of their technical orders. The significant differences in maintenance technicians' perceptions regarding this aspect of their technical data could be attributed to the relative differences in the working conditions and equipment accessibility between actually maintaining aircraft on the flight line or in the hangars and missiles in the field, and maintaining training equipment.

Technicians in the two lowest pay grades and skill levels reported the greatest difficulty working with bulky technical data. Maintenance technicians with less than six years of maintenance experience indicated that they encountered greater difficulty with this aspect of their technical orders, than did technicians with more maintenance experience; however, this difference was not statistically significant. It is possible that the older, more experienced technicians have less problems with the physical size of technical data, than do the younger, less experienced technicians, because the older technicians are more accustomed to using the technical orders.

In general, it was concluded that although maintenance technicians have a favorable attitude toward their technical data, there are some inadequacies with respect to the needs of various AFSCs. It was also concluded that the maintenance technicians' perceptions of whether their technical data are "too big and thick" are significantly related to

the technician's AFSC, skill level, pay grade, supervisory experience, and weapon system.

Although maintenance technicians' perceptions of the adequacy of their technical data were significantly different with respect to AFSC, systematic significant differences were not found with respect to the other five demographic variables. Consequently, Proposition 1 was not supported; there was simply insufficient evidence to conclude that maintenance technicians' perceptions of the adequacy of their technical data are related to the six demographic variables.

Research objective 2. This research objective was to determine whether maintenance technicians' perceptions of the level of writing of their technical data are related to the six demographic factors. Proposition 2 and Research Hypotheses 7 through 12 were used to accomplish this objective.

Maintenance technicians' perceptions of the level of writing of their technical data were found to differ significantly by AFSC. The aircraft and missile maintenance technicians expressed a significantly greater preference for leaving the theory out of technical data, than did the avionic system and training devices technicians. It is interesting to compare these preferences with the test results from Proposition 1 regarding technicians' perceptions of the adequacy of technical data for troubleshooting malfunctions. The avionic system and training devices

maintenance technicians had the least favorable perceptions of the adequacy of troubleshooting information in their technical data, while both the aircraft and missile maintenance technicians considered their technical data to be the most adequate in this respect. These differences imply that different groups of maintenance technicians need different levels of information to do their jobs. Thus, current technical orders meet the needs of some groups of technicians better than others.

Maintenance technicians' perceptions of the level of understanding for which their technical data were written were significantly different for all six demographic variables. Missile, missile electronic, and avionic system technicians most frequently reported that their technical data were written for the level of understanding of a five skill level technician, while both aircraft and aircraft system maintenance technicians most frequently indicated that their technical data were written at a level of understanding for all skill levels. Technicians in the lowest levels of maintenance and supervisory experience, and in the lower skill levels and pay grades reported that the technical data were written at a level of understanding for all skill levels, while technicians in the higher skill levels, pay grades, and experience levels indicated that the technical data were written for the level of understanding of a five skill level technician. It is possible that technicians in lower skill levels, pay grades, and experience levels are hesitant to admit that

they have difficulty comprehending, and thus effectively using current technical data, while the higher skill levels, pay grades, and experience levels recognize a problem in this area due to their daily observation while working with these younger technicians.

Even though maintenance technicians' perceptions of the "level of understanding" for which their technical data were written were significantly different for all six demographic variables, "level of understanding" is just one of the three aspects that comprise "level of writing." The maintenance technicians' perceptions of the other two aspects of "level of writing," "too complicated to understand" and "leave theory out," were not significantly different, except that technicians with different AFSCs did have significantly different perceptions of whether the theory should be left out of technical orders. Since AFSC was the only demographic variable for which maintenance technicians' perceptions of the "level of writing" of their technical data were significantly different, Proposition 2 was not supported; there was insufficient evidence to conclude that maintenance technicians' perceptions of the "level of writing" of their technical data are related to the six demographic variables.

Research objective 3. This research objective was to determine whether maintenance technicians' perceptions of the usage of their technical data are related to six demographic factors. Proposition 3

and Research Hypotheses 13 through 18 were used to accomplish this objective.

Maintenance technicians' perceptions of the usage of their technical data were found to differ significantly by AFSC, skill level, pay grade, and weapon system. The largest percentage of technicians in each demographic category selected "step-by-step performance guide" (how to do the job) as the primary purpose for using technical orders. This finding tends to support the job guide concept that has been introduced to several weapon systems. Technicians in the lowest skill level and the two lowest pay grades reported that "training and familiarization" was also an important use of technical data. This finding could be interpreted to imply that the younger technicians are using technical orders not only to tell them how to do the job, but also to learn about the job. Even though maintenance experience did not significantly support this conclusion, the technicians with less than two years experience selected "training and familiarization" as an important purpose of their T.O.s.

The missile maintenance career field technicians who are associated with the Minuteman III weapon system also indicated that "training and familiarization" was an important use of T.O.s. These technicians could have selected "training and familiarization" as an important use of their T.O.s for several reasons. It is possible that the technicians in the missile maintenance career field, associated

with the Minuteman III weapon system are on the average younger than those technicians in the other career fields and weapon systems; therefore, needing more training and familiarization. It could also be possible that from the maintenance technicians' viewpoint the Minuteman III is a more complex and changing weapon system than the other weapon systems; thereby requiring a greater amount of training and familiarization.

The technicians in the higher pay grades and skill levels (the older, more experienced technicians) seem to feel that T.O.s are important in "troubleshooting" and as a "reference" to find out how something works or where it is located.

Based on the general findings of Proposition 3 it is concluded that the specific demographic characteristics of the technical data user should be considered when technical orders are being developed. The technical order should be developed to provide the user with step-by-step guidance on how to do the job. Additionally, the T.O. should provide information to increase the younger technicians job proficiency and weapon system knowledge. Finally, the technical order should be designed to fulfill the reference and troubleshooting needs of the older, more experienced technicians.

Based on the significant differences found in four of the six demographic variables (AFSC, skill level, pay grade, and weapon system) with respect to the "primary purpose" of T.O.s, and three of

the six demographic variables (AFSC, skill level, and weapon system) with respect to the "secondary purpose" of T.O.s, there was sufficient evidence to support Proposition 3. Therefore, it is concluded that maintenance technicians' perceptions of the usage of their technical data are related to the six demographic variables.

Research objective 4. This research objective was to determine whether maintenance technicians' perceptions of the frequency of usage of their technical data are related to six demographic factors. Proposition 4 and Research Hypotheses 19 through 24 were used to accomplish this objective. A significant difference in the technicians' perceptions was found for all six demographic variables.

Generally, the technicians in the lower skill levels, pay grades, and levels of maintenance experience indicated that they used their technical orders the least. Additionally, technicians in the missile maintenance career field who are associated with the Minuteman III weapon system indicated that they used their technical data less than technicians in other career fields and associated with other weapon systems. It is possible that the younger technicians are involved more with assisting older technicians, and with on-the-job training (OJT) than with actually doing the maintenance tasks. Therefore, they do not use the T.O.s as much at the work station or in doing the job.

In general, technicians with a 7 skill level, 8-10 years of maintenance experience, and approximately 12 years of supervisory experience used their technical orders the most. It is possible that these technicians use their technical data so frequently because they are responsible for supervising the actual work being accomplished, as well as conducting OJT for the younger technicians.

An interesting point is that the technicians with more than 16 years of supervisory experience used technical data less frequently than did technicians in the other supervisory experience categories. These technicians are most likely involved in the administration of maintenance activities, as opposed to the performance of the actual maintenance task, and therefore, do not need to refer to technical data frequently.

The research findings indicate that older, more experienced technicians generally do make frequent use of their technical data. Also, that younger technicians who are still in the learning process use T.O.s very little in doing actual maintenance work. Overall, maintenance technicians' perceptions of the three T.O. aspects that were tested, were found to be significantly different for all six demographic variables, except that technicians' perceptions of the frequency of T.O. use at the work station were not significantly different for AFSC, skill level, or supervisory experience. Therefore, there was sufficient evidence to support Proposition 4 and conclude that the maintenance

technicians' perceptions of the frequency of usage of their technical data are related to the six demographic variables.

Recommendations

As a result of the findings of this research effort, the following recommendations are made.

The research findings indicate that technicians in various AFSCs have different perceptions of their technical orders. For example, the missile maintenance technicians had the most favorable impressions of how current, accurate, and compatible their T.O.s were with the equipment they maintained, but wanted the theory taken out. They felt that "step-by-step guidance" and "training and familiarization" were important uses of T.O.s, but they used their T.O.s less frequently than technicians in other AFSCs. In contrast avionic system technicians had the least favorable perception of how current, accurate, and compatible their T.O.s were with the equipment they maintained, and wanted the theory left in the T.O.s. They felt that "step-by-step guidance" and "troubleshooting" were important uses of the T.O. and used their T.O.s more frequently than technicians in other AFSCs. Since significant differences in technicians' perceptions were found with respect to AFSC in all four propositions, it is recommended that further research should be directed to determine the specific needs of different AFSCs. Once the needs of specific AFSCs are determined, technical data could be designed to better fulfill these needs.

Based on the findings of this research, it appears that future research concerning demographic variables other than AFSC is not warranted. However, if research in this area is undertaken it is recommended that it be directed toward technicians that are using the job guides, since the "step-by-step performance guide" was the use selected as the primary purpose of T.O.s by the largest percentage of technicians in all demographic categories.

APPENDIX A
SURVEY QUESTIONNAIRE

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY (AI)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433



REPLY TO
ATTN OF: LSGR (LSSR 11-78A/Captains Bunch, Holsen & Ward/AUTOVON 785-4698)

SUBJECT: Usability and Suitability of USAF Technical Data Survey

MAR 15 1978

TG:

1. The attached survey was prepared by a research team at the Air Force Institute of Technology, Wright-Patterson AFB, Ohio. The purpose of this survey is to acquire information concerning your perception of technical data used to maintain USAF weapon systems and equipment.
2. You have been selected to participate in this survey to allow collection of user information about technical data. Your participation is totally voluntary. The value of this research effort is dependent upon the effort you make to provide open, honest responses to each question. Your responses will be held confidential. Headquarters USAF Survey Control Number 78-80 has been assigned to this survey.
3. When you have completed the survey return the survey booklet and answer sheet to the project monitor. Your cooperation will be appreciated and be very beneficial in providing current information about the current state of maintenance technical data.

Henry W. Parlett
HENRY W. PARLETT, Colonel, USAF
Associate Dean for Graduate
Education
School of Systems and Logistics

- 2 Atch
1. Privacy Act Stmt
2. Survey

USABILITY AND SUITABILITY OF AIR FORCE
TECHNICAL DATA SURVEY

This survey is designed to obtain your perceptions of your job and Air Force technical data. There are no "trick" questions and there are no "right" answers. Please answer each question as honestly and frankly as possible from the choices available. Select only one answer for each question.

Thank you for your cooperation and willingness to contribute your time and effort to this study.

PRIVACY STATEMENT

In accordance with paragraph 30, AFR 12-35, the following information is provided as required by the Privacy Act of 1974:

a. Authority:

- (1) 5 U.S.C. 301, Departmental Regulations, and/or
- (2) 10 U.S.C. 8012, Secretary of the Air Force. Powers, Duties, Delegation by Compensation; and/or
- (3) DOD Instruction 1100.13, 17 Apr 68, Surveys of Department of Defense Personnel; and/or
- (4) AFR 30-23, 22 Sep 76, Air Force Personnel Survey Program.

b. Principal purposes. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DOD.

c. Routine Uses. The survey data will be converted to information for use in research of management related problems. Results of the research, based on the data provided, will be included in written master's theses and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or presented orally, will be unlimited.

Atch 1

d. Participation in this survey is entirely voluntary.

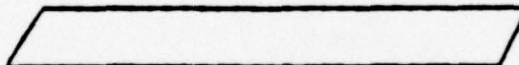
e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

INSTRUCTIONS

Complete the machine scored answer sheet by carefully blackening the answer rectangle completely. Cleanly erase answers you want to change. DO NOT make stray marks on the sheet. Check to be sure that only ONE answer rectangle is blackened for each question. Use a number 2 pencil ONLY.

DO NOT WRITE IN YOUR SOCIAL SECURITY NUMBER.

Enter the 6 digit number that appears in the top right hand corner of the answer sheet in the space provided below.



PART I

Please record your response to the following questions on the answer sheet.

- 1-6. Enter your duty Air Force Speciality Code (AFSC) in lines 1-5 of the answer sheet. If you have a shred-out as well, enter in line 6; if no shredout, darken the letter "Z" in line 6.

EXAMPLE: 43151E

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	0	1	2	3	4	5	6	7
1																																		
2																																		
3																																		
4																																		
5																																		
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7. Indicate whether you are military or civilian.
 - a. Military
 - b. Civilian—if you are a civilian DO NOT complete the remainder of this survey.

8. Enter your current pay grade.

a.	E-1	(5) ^a
b.	E-2	(56)
c.	E-3	(173)
d.	E-4	(126)
e.	E-5	(90)
f.	E-6	(65)
g.	E-7	(28)
	no	(3) ^b

^aTotal number of responses for each option (546 questionnaires).

^bno = missing observations for that particular question.

9. How many years experience do you have in Air Force maintenance?

- a. Less than 2 years (189)
- b. 2 years but less than 4 years (112)
- c. 4 years but less than 6 years (65)
- d. 6 years but less than 8 years (34)
- e. 8 years but less than 10 years (29)
- f. 10 years but less than 12 years (27)
- g. 12 years but less than 14 years (22)
- h. 14 years but less than 16 years (22)
- i. 16 years or more (46)
- no (0)

10. How many years supervisory experience do you have?

- a. Less than 2 years (341)
- b. 2 years but less than 4 years (53)
- c. 4 years but less than 6 years (33)
- d. 6 years but less than 8 years (38)
- e. 8 years but less than 10 years (24)
- f. 10 years but less than 12 years (19)
- g. 12 years but less than 14 years (17)
- h. 14 years but less than 16 years (10)
- i. 16 years or more (7)
- no (4)

PART II

For questions 11-17, indicate on the answer sheet the approximate percentages of your actual work time expended in the following maintenance functions during the average work week.

11. Service and checkout

- | | |
|-------------------------|-------|
| a. Less than 10 percent | (139) |
| b. 10-19 percent | (84) |
| c. 20-29 percent | (73) |
| d. 30-39 percent | (50) |
| e. 40-49 percent | (37) |
| f. 50-59 percent | (57) |
| g. 60-69 percent | (30) |
| h. 70-79 percent | (32) |
| i. 80-89 percent | (15) |
| j. 90 percent or more | (25) |
| no | (4) |

12. Troubleshooting

- | | |
|-------------------------|-------|
| a. Less than 10 percent | (215) |
| b. 10-19 percent | (98) |
| c. 20-29 percent | (71) |
| d. 30-39 percent | (55) |
| e. 40-49 percent | (26) |
| f. 50-59 percent | (35) |
| g. 60-69 percent | (15) |
| h. 70-79 percent | (15) |
| i. 80-89 percent | (4) |
| j. 90 percent or more | (8) |
| no | (4) |

13. Replacement

a. Less than 10 percent	(172)
b. 10-19 percent	(112)
c. 20-29 percent	(64)
d. 30-39 percent	(44)
e. 40-49 percent	(26)
f. 50-59 percent	(43)
g. 60-69 percent	(20)
h. 70-79 percent	(24)
i. 80-89 percent	(16)
j. 90 percent or more	(21)
no	(4)

14. Inspection

a. Less than 10 percent	(139)
b. 10-19 percent	(89)
c. 20-29 percent	(56)
d. 30-39 percent	(54)
e. 40-49 percent	(31)
f. 50-59 percent	(55)
g. 60-69 percent	(20)
h. 70-79 percent	(29)
i. 80-89 percent	(20)
j. 90 percent or more	(50)
no	(3)

15. Adjustment

- | | |
|-------------------------|-------|
| a. Less than 10 percent | (293) |
| b. 10-19 percent | (85) |
| c. 20-29 percent | (56) |
| d. 30-39 percent | (35) |
| e. 40-49 percent | (19) |
| f. 50-59 percent | (26) |
| g. 60-69 percent | (9) |
| h. 70-79 percent | (10) |
| i. 80-89 percent | (3) |
| j. 90 percent or more | (5) |
| no | (5) |

16. Repair

- | | |
|-------------------------|-------|
| a. Less than 10 percent | (200) |
| b. 10-19 percent | (116) |
| c. 20-29 percent | (58) |
| d. 30-39 percent | (38) |
| e. 40-49 percent | (27) |
| f. 50-59 percent | (30) |
| g. 60-69 percent | (13) |
| h. 70-79 percent | (20) |
| i. 80-89 percent | (15) |
| j. 90 percent or more | (26) |
| no | (3) |

17. When required to work on a piece of equipment with which you are unfamiliar, what percentage of the total job time do you generally spend in seeking information in T.O.s?

- | | |
|---|-------|
| a. More than 50 percent | (114) |
| b. 25-49 percent | (154) |
| c. 10-24 percent | (144) |
| d. Less than 10 percent | (87) |
| e. None. I seek guidance from someone else. | (39) |
| no | (8) |

PART III

For questions 18-25, rank order each of the reference series according to the amount of time you spend using each series in your day-to-day work and record your response on the answer sheet.

18. 00 series, General Publications
19. Dash -2 series, Organizational Maintenance
20. Dash -4 series, Illustrated Parts Breakdown
21. Field Maintenance Instruction - Airborne Equipment
22. Operation and Service Instruction - Ground Equipment
23. Overhaul Instruction - Components
24. Dash -6 series, Inspection Requirements
25. Dash -06, Work Unit Code Manual
 - a. 1st (Most)
 - b. 2nd
 - c. 3rd
 - d. 4th
 - e. 5th
 - f. 6th
 - g. 7th
 - h. 8th (Least)^a

^a See Table A-1

Table A-1
Consolidation of Responses (All Bases)

Response	Questions							
	18	19	20	21	22	23	24	25
a. 1st (Most)	45	164	56	59	47	23	89	103
b. 2nd	31	64	126	20	57	36	69	107
c. 3rd	30	57	127	32	52	41	85	100
d. 4th	51	39	88	31	57	63	90	81
e. 5th	63	29	50	44	102	67	62	59
f. 6th	60	46	43	72	80	89	55	23
g. 7th	70	73	19	96	72	79	49	31
h. 8th (Least)	183	63	27	180	70	134	38	35
mo	(13)	(11)	(10)	(12)	(9)	(14)	(9)	(7)

PART IV

Please record your response to the following questions on the answer sheet.

26. How many times during the average work week do you refer to a maintenance T.O. in getting your job done?
- a. Less than 5 times (96)
 - b. 5-10 times (111)
 - c. 11-20 times (110)
 - d. 21-50 times (124)
 - e. More than 50 times (100)
 - no (5)
27. To what extent do you actually use the T.O. at your work station as a performance aid to tell you what to do next or what to check for in the task indicated?
- a. Always (138)
 - b. Frequently (233)
 - c. Seldom (113)
 - d. Never (22)
 - e. Use work cards (36)
 - no (4)
28. Are all T.O.s which you need in your job readily available and accessible for your use?
- a. Yes (473)
 - b. No - some essential T.O.s are not too available (57)
 - c. No - Technical Order file is too far from my work (11)
 - d. Yes - I use my personal copy of needed T.O.s (2)
 - no (3)

29. Are the T.O.s which you use up-to-date, accurate, and compatible with the equipment which you maintain?
- a. Yes (363)
 - b. Yes - most are with the exception of some T.O.s (138)
 - c. No - but does not affect my work (12)
 - d. No - and this causes me a great deal of trouble (27)
no (6)
30. For what primary purpose do you use T.O.s?
- a. Training and familiarization (70)
 - b. Reference (to find out how it works or where it is located) (93)
 - c. Step-by-step performance (how to do the job) (187)
 - d. Troubleshooting (81)
 - e. Information on how to repair or replace components (51)
 - f. Part number information (41)
 - g. None of the above (21)
no (2)
31. For what secondary purpose do you use T.O.s?
- a. Training and familiarization (111)
 - b. Reference (to find out how it works or where it is located) (98)
 - c. Step-by-step performance (how to do the job) (77)
 - d. Troubleshooting (99)
 - e. Information on how to repair or replace components (70)
 - f. Part number information (58)
 - g. None of the above (31)
no (2)

32. What is your opinion of the value of the T.O. as a training device?
- a. Absolutely necessary (226)
 - b. Necessary (243)
 - c. Undecided (56)
 - d. Unnecessary (11)
 - e. Absolutely unnecessary (7)
 - no (3)
33. In your opinion, how good are T.O.s as a training device?
- a. No improvement needed (135)
 - b. Should be improved (271)
 - c. Handier if training information were in one book and the work information in another (134)
 - no (6)
34. For what level of understanding do you feel maintenance T.O.s are written?
- a. 7 skill level and above (74)
 - b. 5 skill level (214)
 - c. 3 skill level (55)
 - d. 1 skill level (10)
 - e. All skill levels (188)
 - no (5)

35. If you could have only one of the following from the T.O. system to do your job, which one would you select?

- a. Description and theory of operation (54)
- b. Step-by-step written instructions (171)
- c. Schematics (60)
- d. Data flow diagrams (11)
- e. Pictures showing step-by-step procedures (103)
- f. Wiring diagrams (15)
- g. Illustrated parts breakdown (64)
- h. Work cards (63)
- no (5)

36. Which one of the following changes would do most to improve the part of the Air Force Technical Order system you use in doing your job?

- a. More detailed explanations (words and pictures) (199)
- b. More specific data (voltages, waveforms, tolerances) (101)
- c. Less information on "How it works," and more on "How to do the job." (116)
- d. More theory of operation and less detailed work instructions (50)
- e. Other (74)
- no (6)

37. Which one of the following methods do you feel would do most to improve troubleshooting information in T.O.s?

- a. Better and more complete schematics (84)
- b. More step-by-step written procedures (99)
- c. Present information in maintenance T.O.s is satisfactory for troubleshooting (73)
- d. I don't use T.O. information for troubleshooting (47)
- e. Provide better feedback of troubleshooting (36)
- f. Establish some more effective procedure or scheme to be followed in isolating malfunctions (166)
- g. Other (34)
- no (7)

38. Which one of the following procedural guides would be most effective to you as a performance aid in your day-to-day work?

- a. Checklists or work cards (165)
- b. Existing T.O. handbook (84)
- c. T.O. in pocketbook size (Job Guide Manuals) (142)
- d. Job-oriented or "picture-book" step-by-step instructions (89)
- e. Schematics and/or troubleshooting information readily available and projected on a work screen at my work station (32)
- f. Schematics and/or step-by-step instruction decals on the equipment covers and access panels (23)
- no (11)

39. When you find an error or incorrect procedure in a T.O. or work card, what do you do?

- a. Tell my supervisor (162)
- b. Complete and submit an AFTO Form 22 (288)
- c. Ignore it, since it does not do any good to report it (34)
- d. I have never seen an error in a T.O. (55)
- no (7)

PART V

For questions 40-44, please indicate if the T.O. was used as the principal text during training.

40. A.P. Technical School

- a. Yes (354)
- b. No (189)
mo (3)

41. Mobile Training Unit

- a. Yes (228)
- b. No (286)
mo (32)

42. On-the-Job-Training (OJT)

- a. Yes (437)
- b. No (104)
mo (5)

43. Unit (local) Base Training Classes

- a. Yes (369)
- b. No (165)
mo (12)

44. Factory Training School

- a. Yes (168)
- b. No (329)
mo (49)

PART VI

For questions 45-59, please indicate the degree to which you agree or disagree with the following statements.

45. T.O.s are too simple.

- a. Strongly agree (11)
- b. Agree (35)
- c. Undecided (116)
- d. Disagree (315)
- e. Strongly disagree (66)
- no (3)

46. Different T.O.s say the same things over and over.

- a. Strongly agree (43)
- b. Agree (155)
- c. Undecided (131)
- d. Disagree (196)
- e. Strongly disagree (17)
- no (4)

47. T.O.s would be more useful if they had more pictures.

- a. Strongly agree (70)
- b. Agree (215)
- c. Undecided (121)
- d. Disagree (130)
- e. Strongly disagree (6)
- no (4)

48. It is very difficult to find the information I need.

- a. Strongly agree (61)
- b. Agree (127)
- c. Undecided (84)
- d. Disagree (241)
- e. Strongly disagree (28)
- no (5)

49. T.O.s are too complicated for me to understand.

- a. Strongly agree (9)
- b. Agree (37)
- c. Undecided (64)
- d. Disagree (378)
- e. Strongly disagree (54)
no (4)

50. T.O.s are too big and thick to use on my job.

- a. Strongly agree (60)
- b. Agree (149)
- c. Undecided (76)
- d. Disagree (227)
- e. Strongly disagree (30)
no (4)

51. T.O.s explain the simpler things adequately but fail to provide sufficient information as things get more complicated.

- a. Strongly agree (79)
- b. Agree (199)
- c. Undecided (136)
- d. Disagree (121)
- e. Strongly disagree (7)
no (4)

52. T.O.s should leave the theory out and just tell me how to do the job.

- a. Strongly agree (28)
- b. Agree (91)
- c. Undecided (92)
- d. Disagree (226)
- e. Strongly disagree (105)
no (4)

53. T.O.s are just fine the way they are.

- a. Strongly agree (10)
- b. Agree (66)
- c. Undecided (143)
- d. Disagree (249)
- e. Strongly disagree (74)
no (4)

54. I rarely refer to T.O.s in doing my job.

- a. Strongly agree (25)
- b. Agree (85)
- c. Undecided (33)
- d. Disagree (262)
- e. Strongly disagree (138)
no (3)

55. Some T.O.s I need are not available.

- a. Strongly agree (19)
- b. Agree (84)
- c. Undecided (68)
- d. Disagree (308)
- e. Strongly disagree (63)
no (4)

56. T.O.s present adequate troubleshooting information for me to quickly correct malfunctions.

- a. Strongly agree (8)
- b. Agree (136)
- c. Undecided (163)
- d. Disagree (171)
- e. Strongly disagree (61)
no (7)

57. The people who wrote maintenance T.O.s evidently did not know much about maintenance.

- a. Strongly agree (43)
- b. Agree (98)
- c. Undecided (144)
- d. Disagree (39)
- e. Strongly disagree (43)
no (5)

58. I have to refer to too many T.O.s to get my job done.

- a. Strongly agree (42)
- b. Agree (118)
- c. Undecided (80)
- d. Disagree (274)
- e. Strongly disagree (27)
no (5)

59. A better numbering system for T.O.s would make it easier to use or to find what I need.

- a. Strongly agree (87)
- b. Agree (139)
- c. Undecided (133)
- d. Disagree (164)
- e. Strongly disagree (15)
no (8)

PART VII

Please answer the following questions in the space provided.

60. List any T.O. you use which you feel is not up-to-date, accurate, and compatible with the equipment you maintain.

61. List what you feel are the most significant deficiencies in the Air Force T.O. system.

62. What changes would you make in the Air Force T.O. system if it were in your power to change it?

APPENDIX B
DISTRIBUTION OF RESPONDENTS BY
DEMOGRAPHIC VARIABLE

Table B-1

Distribution of Respondents by AFSC

Maintenance AFSC	Number of Respondents	Percentage of Total Respondents
31 (Missile Electronic)	37	6.8
32 (Avionics System)	114	20.9
34 (Training Devices)	8	1.5
40 (Intricate Equipment)	1	0.2
42 (Aircraft System)	138	25.3
43 (Aircraft)	183	33.5
44 (Missile)	49	9.0
Missing Values	16	2.9
Total Number of Respondents	546	100.0

Table B-2

Distribution of Respondents by Skill Level

Skill Level	Number of Respondents	Percentage of Total Respondents
One	2	0.4
Three	78	14.3
Five	305	55.9
Seven	149	27.3
Missing Values	12	2.2
Total Number of Respondents	546	100.0

Table B-3

Distribution of Respondents by Pay Grade

Pay Grade	Number of Respondents	Percentage of Total Respondents
E1	5	0.9
E2	56	10.3
E3	173	31.7
E4	126	23.1
E5	90	16.5
E6	65	11.9
E7	28	5.1
Missing Values	3	0.5
Total Number of Respondents	546	100.0

Table B-4

Distribution of Respondents by Maintenance Experience

Maintenance Experience (in years)	Number of Respondents	Percentage of Total Respondents
Less than 2	189	34.6
2-4	112	20.5
4-6	65	11.9
6-8	34	6.2
8-10	29	5.3
10-12	27	4.9
12-14	22	4.0
14-16	22	4.0
16 or more	46	8.4
Missing Values	0	0.0
Total Number of Respondents	546	100.0

Table B-5

Distribution of Respondents by Supervisory Experience

Supervisory Experience (in years)	Number of Respondents	Percentage of Total Respondents
Less than 2	341	62.5
2-4	53	9.7
4-6	33	6.0
6-8	38	7.0
8-10	24	4.4
10-12	19	3.5
12-14	17	3.1
14-16	10	1.8
16 or more	7	1.3
Missing Values	4	0.7
Total Number of Respondents	546	100.0

Table B-6

Distribution of Respondents by Weapon System

Weapon System	Number of Respondents	Percentage of Total Respondents
C-130	99	18.1
MIII	88	16.1
B-52/KC-135	99	18.1
C-5	99	18.1
RF-4	76	13.9
F-15	83	15.2
Missing Values	2	0.3
Total Number of Respondents	546	100.0

APPENDIX C
DATA APPLICABLE TO PROPOSITION 1

INTRODUCTION

This appendix contains the research hypotheses, statistical hypotheses, survey questions, and statistical test results associated with Proposition 1.

DATA PRESENTATION FORMAT

The data is presented in numerical order by research hypothesis. For each research hypothesis the related statistical hypotheses are stated along with the applicable survey questions. Each survey question is followed by a table which presents the data pertaining to the test of the statistical hypothesis. Each table contains the following information:

- a. For each category of the demographic variable the number of respondents selecting each response category.
- b. The percentage of respondents within each category of the demographic variable, and the percentage of total respondents selecting each response category (all percentages are in parentheses).

- c. The "mean rank"¹⁰ score for each demographic category, if applicable. ¹¹
- d. The total number of respondents in each demographic category.
- e. The total number of respondents selecting each response category.
- f. The total number of valid responses.
- g. The calculated χ^2 value.
- h. The degrees of freedom (df).
- i. The level of significance (p).

¹⁰"Mean ranks" are calculated by rank ordering all of the responses from lowest to highest (response a = 1, response b = 2, etc.) Since there are numerous ties, each tied score is given the mean of the ranks for which it is tied. All of the rankings for each category of the demographic variable are then summed to determine the "mean ranks" sum or "mean ranks" score for each demographic category. The Kruskal-Wallis test compares these "mean ranks" scores for the demographic categories to determine whether they are significantly different. For the purposes of this research a low "mean rank" score generally indicates a relatively greater agreement with the statement or question contained in the survey question, than does a high "mean ranks" score.

¹¹"Mean ranks" scores are applicable only for those tables that summarize a Kruskal-Wallis test.

DATA PRESENTATION

Proposition 1

Maintenance technicians' perceptions of the adequacy of their technical data are related to six demographic variables (i.e., AFSC, skill level, pay grade, maintenance experience, supervisory experience, and weapon system).

Research Hypothesis 1

Maintenance technicians' perceptions of the adequacy of their technical data are related to their AFSC.

Statistical Hypothesis 1-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy and compatibility with equipment maintained are related to their AFSC.

Survey Question 29

Are the T.O.s which you use up-to-date, accurate, and compatible with the equipment which you maintain?

- a. Yes
- b. Yes--most are with the exception of some T.O.s
- c. No--but it does not affect my work
- d. No--and this causes me a great deal of trouble

Table C1-1

Responses to Question 29 by AFSC and
Results of Kruskal-Wallis Test
(N = 523, $\alpha = .05$)

AFSC	Responses				Row Total	Mean Rank
	a	b	c	d		
31	27 (73.0)	6 (16.2)	2 (5.4)	2 (5.4)	37 (100.0)	245.33
32	59 (52.7)	38 (33.9)	4 (3.6)	11 (9.8)	112 (100.0)	312.50
34	1 (12.5)	3 (37.5)	0 (0.0)	4 (50.0)	8 (100.0)	448.44
42	95 (69.9)	34 (25.0)	3 (2.2)	4 (2.9)	136 (100.0)	261.95
43	130 (71.4)	47 (25.8)	2 (1.1)	3 (1.6)	182 (100.0)	255.95
44	36 (75.0)	9 (18.8)	0 (0.0)	3 (6.3)	48 (100.0)	250.53
Column Total	348 (66.5)	137 (26.2)	11 (2.1)	27 (5.2)	523 (100.0)	

Computed $\chi^2 = 33.413$, $df = 5$, $p < .001$

Statistical Hypothesis 1-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their AFSC.

Survey Question 33

In your opinion, how good are T.O.s as a training device?

- a. No improvement needed
- b. Should be improved
- c. Handier if training information were in one book and the work information in another.

Table C1-2

Responses to Question 33 by AFSC and
Results of Chi Square Test*
(N = 516, $\alpha = .05$)

AFSC	Responses			Row Total
	a	b	c	
31	10 (27.0)	18 (48.6)	9 (24.4)	37 (100.0)
32	31 (27.4)	61 (54.0)	21 (18.6)	113 (100.0)
42	30 (21.9)	75 (54.7)	32 (23.4)	137 (100.0)
43	45 (24.9)	84 (46.4)	52 (28.7)	181 (100.0)
44	14 (29.2)	20 (41.7)	14 (29.1)	48 (100.0)
Column Total	130 (25.2)	258 (50.0)	128 (24.8)	516 (100.0)

Computed $\chi^2 = 6.669$, $df = 8$, $p = .573$

* Note: AFSC 34 was deleted to meet cell size criteria required by the Chi Square test.

Statistical Hypothesis 1-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their AFSC.

Survey Question 48

It is very difficult to find the information I need.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C1-3

Responses to Question 48 by AFSC and
Results of Kruskal-Wallis Test
(N = 525, $\alpha = .05$)

AFSC	Responses					Row Total	Mean Rank
	a	b	c	d	e		
31	3 (8.1)	8 (21.6)	3 (8.1)	20 (54.1)	3 (8.1)	37 (100.0)	293.21
32	11 (9.7)	35 (31.0)	16 (14.2)	49 (43.4)	2 (1.8)	113 (100.0)	254.12
34	4 (50.0)	2 (25.0)	0 (0.0)	1 (12.5)	1 (12.5)	8 (100.0)	161.81
42	9 (6.6)	30 (21.9)	30 (21.9)	59 (43.1)	9 (6.6)	137 (100.0)	283.78
43	27 (14.8)	42 (23.1)	22 (12.1)	80 (44.0)	11 (6.0)	182 (100.0)	265.94
44	4 (8.3)	8 (16.7)	10 (20.3)	25 (52.1)	1 (2.1)	48 (100.0)	287.11
Column Total	58 (11.0)	125 (23.8)	81 (15.4)	234 (44.6)	27 (5.1)	525 (100.0)	

Computed $\chi^2 = 8.851$, $df = 5$, $p = .115$

Statistical Hypothesis 1-4

Maintenance technicians' perceptions of whether their technical data are too big and thick to use on the job are related to their AFSC.

Survey Question 50

T.O.s are too big and thick to use on my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C1-4

Responses to Question 50 by AFSC and
Results of Kruskal-Wallis Test
(N = 525, $\alpha = .05$)

AFSC	Responses					Row Total	Mean Rank
	a	b	c	d	e		
31	3 (8.1)	11 (29.7)	4 (10.8)	19 (51.4)	0 (0.0)	37 (100.0)	283.49
32	9 (8.0)	28 (24.8)	13 (11.5)	57 (50.4)	6 (5.3)	113 (100.0)	293.63
34	0 (0.0)	2 (25.0)	0 (0.0)	6 (75.0)	0 (0.0)	8 (100.0)	333.00
42	10 (7.3)	34 (24.8)	22 (16.1)	62 (45.3)	9 (6.6)	137 (100.0)	290.70
43	32 (17.6)	53 (29.1)	23 (12.6)	63 (34.6)	11 (6.0)	182 (100.0)	245.95
44	5 (10.4)	17 (35.4)	11 (22.9)	13 (27.1)	2 (4.2)	48 (100.0)	237.75
Column Total	59 (11.2)	145 (27.6)	73 (13.9)	220 (41.9)	28 (5.3)	525 (100.0)	

Computed $\chi^2 = 14.352$, $df = 5$, $p = .014$

Statistical Hypothesis 1-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately but fail to provide sufficient information as things get more complicated are related to their AFSC.

Survey Question 51

T.O.s explain the simpler things adequately but fail to provide sufficient information as things get more complicated.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C1-5

Responses to Question 51 by AFSC and
Results of Kruskal-Wallis Test
(N = 525, $\alpha = .05$)

AFSC	Responses					Row Total	Mean Rank
	a	b	c	d	e		
31	7 (18.9)	15 (40.5)	6 (16.2)	8 (21.6)	1 (2.7)	37 (100.0)	262.06
32	22 (19.5)	52 (46.0)	19 (16.8)	19 (16.8)	1 (0.9)	113 (100.0)	233.06
34	1 (12.5)	0 (0.0)	4 (50.0)	3 (37.5)	0 (0.0)	8 (100.0)	356.38
42	17 (12.4)	44 (32.1)	39 (28.5)	35 (25.5)	2 (1.5)	137 (100.0)	290.31
43	25 (13.7)	65 (35.7)	48 (26.4)	41 (22.5)	3 (1.6)	182 (100.0)	276.70
44	7 (14.6)	14 (29.2)	15 (31.3)	12 (25.0)	0 (0.0)	48 (100.0)	285.07
Column Total	79 (15.0)	190 (36.2)	131 (25.0)	118 (22.5)	7 (1.3)	525 (100.0)	

Computed $\chi^2 = 12.920$, $df = 5$, $p = .024$

Statistical Hypothesis 1-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their AFSC.

Survey Question 56

T.O.s present adequate troubleshooting information for me to quickly correct malfunctions.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C1-6

Responses to Question 56 by AFSC and
Results of Kruskal-Wallis Test
(N = 523, $\alpha = .05$)

AFSC	Responses					Row Total	Mean Rank
	a	b	c	d	e		
31	0 (0.0)	9 (24.3)	9 (24.3)	13 (35.1)	6 (16.2)	37 (100.0)	275.59
32	1 (0.9)	28 (24.8)	18 (15.9)	43 (38.1)	23 (20.4)	113 (100.0)	308.15
34	0 (0.0)	1 (12.5)	1 (12.5)	3 (37.5)	3 (37.5)	8 (100.0)	376.06
42	3 (2.2)	33 (24.1)	50 (36.5)	40 (29.2)	11 (8.0)	137 (100.0)	256.62
43	4 (2.2)	45 (25.0)	64 (35.6)	53 (29.4)	14 (7.8)	180 (100.0)	254.89
44	0 (0.0)	14 (29.2)	17 (35.4)	13 (27.1)	4 (8.3)	48 (100.0)	251.21
Column Total	8 (1.5)	130 (24.9)	159 (30.4)	165 (31.5)	61 (11.7)	523 (100.0)	

Computed $\chi^2 = 15.130$, $df = 5$, $p = .010$

Research Hypothesis 2

Maintenance technicians' perceptions of the adequacy of their technical data are related to their skill level.

Statistical Hypothesis 2-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their skill level.

Survey Question 29

Are the T.O.s which you use up-to-date, accurate, and compatible with the equipment which you maintain?

- a. Yes
- b. Yes--most are with the exceptions of some T.O.s
- c. No--but it does not affect my work
- d. No--and this causes me a great deal of trouble.

Table C2-1

Responses to Question 29 by Skill Level and
Results of Kruskal-Wallis Test
(N = 526, $\alpha = .05$)

AFSC	Responses				Row Total	Mean Rank
	a	b	c	d		
3 Level	56 (72.7)	13 (16.9)	2 (2.6)	6 (7.8)	77 (100.0)	254.02
5 Level	204 (67.8)	78 (25.9)	6 (2.0)	13 (4.3)	301 (100.0)	268.30
7 Level	91 (61.5)	46 (31.1)	3 (2.0)	8 (5.4)	148 (100.0)	285.10
Column Total	351 (66.7)	137 (26.0)	11 (2.1)	27 (5.1)	526 (100.0)	

Computed $\chi^2 = 3.491$, $df = 2$, $p = .175$

Statistical Hypothesis 2-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their skill level.

Survey Question 33

In your opinion, how good are T.O.s as a training device?

- a. No improvement needed
- b. Should be improved
- c. Handier if training information were in one book and the work information in another.

Table C2-2

Responses to Question 33 by Skill Level and
Results of Chi Square Test
(N = 527, $\alpha = .05$)

Skill Level	Responses			Row Total
	a	b	c	
3 Level	19 (24.7)	38 (49.4)	20 (25.9)	77 (100.0)
5 Level	73 (24.3)	146 (48.5)	82 (27.2)	301 (100.0)
7 Level	38 (25.5)	83 (55.7)	28 (18.8)	149 (100.0)
Column Total	130 (24.7)	267 (50.7)	130 (24.7)	527 (100.0)

Computed $\chi^2 = 4.061$, $df = 2$, $p = .398$

Statistical Hypothesis 2-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their skill level.

Survey Question 48

It is very difficult to find the information I need.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C2-3

Responses to Question 48 by Skill Level and
Results of Kruskal-Wallis Test
(N = 528, $\alpha = .05$)

Skill Level	Responses					Row Total	Mean Rank
	a	b	c	d	e		
3 Level	8 (10.4)	20 (26.0)	16 (20.8)	31 (40.3)	2 (2.6)	77 (100.0)	265.62
5 Level	34 (11.3)	75 (24.8)	47 (15.6)	128 (42.4)	11 (6.0)	302 (100.0)	268.42
7 Level	18 (12.1)	32 (21.5)	17 (11.4)	75 (50.3)	7 (4.7)	149 (100.0)	279.49
Column Total	60 (11.4)	127 (24.1)	80 (15.2)	234 (44.3)	27 (5.1)	528 (100.0)	

Computed $\chi^2 = 0.704$, $df = 2$, $p = .703$

Statistical Hypothesis 2-4

Maintenance technicians' perceptions of whether their technical data are too big and thick to use on the job are related to their skill level.

Survey Question 50

T.O.s are too big and thick to use on my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C2-4

Responses to Question 50 by Skill Level and
Results of Kruskal-Wallis Test
(N = 528, $\alpha = .05$)

Skill Level	Responses					Row Total	Mean Rank
	a	b	c	d	e		
3 Level	7 (9.1)	24 (31.2)	14 (18.2)	31 (40.3)	1 (1.3)	77 (100.0)	264.98
5 Level	37 (12.3)	91 (30.1)	48 (15.9)	108 (35.8)	18 (6.0)	302 (100.0)	257.88
7 Level	14 (9.4)	32 (21.5)	13 (8.7)	80 (53.7)	10 (6.7)	149 (100.0)	303.08
Column Total	58 (11.0)	147 (27.8)	75 (14.2)	219 (41.5)	29 (5.5)	528 (100.0)	

Computed $\chi^2 = 9.431$, $df = 2$, $p = .009$

Statistical Hypothesis 2-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately but fail to provide sufficient information as things get more complicated are related to their skill level.

Survey Question 51

T.O.s explain the simpler things adequately but fail to provide sufficient information as things get more complicated.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C2-5

Responses to Question 51 by Skill Level and
Results of Kruskal-Wallis Test
(N = 528, $\alpha = .05$)

Skill Level	Responses					Row Total	Mean Rank
	a	b	c	d	e		
3 Level	11 (14.3)	25 (32.5)	31 (40.3)	10 (13.0)	0 (0.0)	77 (100.0)	262.29
5 Level	48 (15.9)	108 (35.8)	79 (26.2)	64 (21.2)	3 (1.0)	302 (100.0)	267.03
7 Level	19 (12.8)	58 (38.9)	23 (15.4)	45 (30.2)	4 (2.7)	149 (100.0)	286.19
Column Total	78 (14.8)	191 (36.2)	133 (25.2)	119 (22.5)	7 (1.3)	528 (100.0)	

Computed $\chi^2 = 2.034$, $df = 2$, $p = .362$

Statistical Hypothesis 2-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their skill level.

Survey Question 56

T.O.s present adequate troubleshooting information for me to quickly correct malfunctions.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C2-6

Responses to Question 56 by Skill Level and
Results of Kruskal-Wallis Test
(N = 525, $\alpha = .05$)

Skill Level	Responses					Row Total	Mean Rank
	a	b	c	d	e		
3 Level	0 (0.0)	18 (23.4)	33 (42.9)	23 (29.9)	3 (3.9)	77 (100.0)	248.56
5 Level	6 (2.0)	69 (23.0)	103 (34.3)	81 (27.0)	41 (13.7)	300 (100.0)	270.95
7 Level	2 (1.4)	43 (29.1)	24 (16.2)	63 (42.6)	16 (10.8)	148 (100.0)	281.25
Column Total	8 (1.5)	130 (24.8)	160 (30.5)	167 (31.8)	60 (11.4)	525 (100.0)	

Computed $\chi^2 = 2.718$, $df = 2$, $p = .257$

Research Hypothesis 3

Maintenance technicians' perceptions of the adequacy of their technical data are related to their pay grade.

Statistical Hypothesis 3-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their pay grade.

Survey Question 29

Are the T.O.s which you use up-to-date, accurate, and compatible with the equipment which you maintain?

- a. Yes
- b. Yes--most are with the exceptions of some T.O.s
- c. No--but it does not affect my work
- d. No--and this causes me a great deal of trouble.

Pay Grade	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Yes	10	15	20	25	30	35	40
Yes--most are with the exceptions of some T.O.s	15	20	25	30	35	40	45
No--but it does not affect my work	5	10	15	20	25	30	35
No--and this causes me a great deal of trouble.	5	10	15	20	25	30	35
Total	35	60	75	100	125	140	155

Table C3-1

Responses to Question 29 by Pay Grade and
Results of Kruskal-Wallis Test
(N = 537, $\alpha = .05$)

Pay Grade	Responses				Row Total	Mean Rank
	a	b	c	d		
E1	3 (60.0)	1 (20.0)	1 (20.0)	0 (0.0)	5 (100.0)	254.00
E2	44 (80.0)	9 (16.4)	1 (1.8)	1 (1.8)	55 (100.0)	235.18
E3	113 (66.9)	40 (23.7)	5 (3.0)	11 (6.5)	169 (100.0)	273.38
E4	84 (66.7)	34 (27.0)	1 (0.8)	7 (5.6)	126 (100.0)	271.35
E5	53 (59.6)	31 (34.8)	2 (2.2)	3 (3.4)	89 (100.0)	288.20
E6	44 (67.7)	16 (24.6)	1 (1.5)	4 (6.2)	65 (100.0)	269.90
E7	19 (67.9)	7 (25.0)	1 (3.6)	1 (3.6)	28 (100.0)	268.57
Column Total	360 (67.0)	138 (25.7)	12 (2.2)	27 (5.0)	537 (100.0)	

Computed $\chi^2 = 6.062$, $df = 6$, $p = .416$

Statistical Hypothesis 3-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their pay grade.

Survey Question 33

In your opinion, how good are T.O.s as a training device?

- a. No improvement needed
- b. Should be improved
- c. Handier if training information were in one book and the work information in another.

Table C3-2

Responses to Question 33 by Pay Grade and
Results of Chi Square Test*
(N = 537, $\alpha = .05$)

Pay Grade	Responses			Row Total
	a	b	c	
E1/E2	14 (23.7)	30 (50.8)	15 (25.5)	59 (100.0)
E3	45 (26.6)	76 (45.0)	48 (28.4)	169 (100.0)
E4	30 (23.8)	64 (50.8)	32 (25.4)	126 (100.0)
E5	23 (25.6)	51 (56.7)	16 (17.7)	90 (100.0)
E6	15 (23.1)	36 (55.4)	14 (21.5)	65 (100.0)
E7	7 (25.0)	13 (46.4)	8 (28.6)	28 (100.0)
Column Total	134 (25.0)	270 (50.3)	133 (24.8)	537 (100.0)

Computed $\chi^2 = 5.648$, $df = 10$, $p = .844$

*Note: Responses for E1s and E2s were combined to meet the cell size criteria for the Chi Square test.

Statistical Hypothesis 3-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their pay grade.

Survey Question 48

It is very difficult to find the information I need.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C3-3

Responses to Question 48 by Pay Grade and
Results of Kruskal-Wallis Test
(N = 538, $\alpha = .05$)

Pay Grade	Responses					Row Total	Mean Rank
	a	b	c	d	e		
E1	0 (0.0)	1 (25.0)	0 (0.0)	3 (75.)	0 (0.0)	4 (100.0)	316.43
E2	6 (10.9)	11 (20.0)	12 (21.8)	24 (43.6)	2 (3.6)	55 (100.0)	269.35
E3	19 (11.2)	44 (25.9)	27 (15.9)	70 (41.2)	10 (5.9)	170 (100.0)	265.28
E4	14 (11.2)	33 (26.2)	17 (13.5)	57 (45.2)	5 (4.0)	126 (100.0)	266.00
E5	11 (12.2)	17 (18.9)	13 (14.4)	41 (45.6)	8 (8.9)	90 (100.0)	286.62
E6	10 (15.4)	14 (21.5)	10 (15.4)	28 (43.1)	3 (4.6)	65 (100.0)	250.79
E7	1 (3.6)	6 (21.4)	5 (17.9)	16 (57.1)	0 (0.0)	28 (100.0)	293.63
Column Total	61 (11.3)	126 (23.4)	84 (15.6)	239 (44.4)	28 (5.2)	538 (100.0)	

Computed $\chi^2 = 3.040$, $df = 6$, $p = .804$

Statistical Hypothesis 3-4

Maintenance technicians' perceptions of whether their technical data are too big and thick to use on the job are related to their pay grade.

Survey Question 50

T.O.s are too big and thick to use on my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C3-4

Responses to Question 50 by Pay Grade and
Results of Kruskal-Wallis Test
(N = 539, $\alpha = .05$)

Pay Grade	Responses					Row Total	Mean Rank
	a	b	c	d	e		
E1	0 (0.0)	1 (20.0)	3 (60.0)	1 (20.0)	0 (0.0)	5 (100.0)	230.13
E2	6 (10.9)	23 (41.8)	7 (12.7)	19 (34.5)	0 (0.0)	55 (100.0)	229.12
E3	21 (12.4)	40 (23.5)	30 (17.6)	68 (40.0)	11 (6.5)	170 (100.0)	272.94
E4	15 (11.9)	43 (34.1)	20 (15.9)	42 (33.3)	6 (4.8)	126 (100.0)	247.11
E5	9 (10.0)	23 (25.6)	4 (4.4)	44 (48.9)	10 (11.1)	90 (100.0)	302.23
E6	6 (9.2)	10 (15.4)	4 (6.2)	42 (64.6)	3 (4.6)	65 (100.0)	320.98
E7	2 (7.1)	8 (28.6)	8 (28.6)	10 (35.7)	0 (0.0)	28 (100.0)	253.96
Column Total	59 (10.9)	148 (27.3)	76 (14.1)	226 (41.9)	30 (5.6)	539 (100.0)	

Computed $\chi^2 = 19.925$, $df = 6$, $p = .003$

Statistical Hypothesis 3-5

Maintenance technicians' perceptions of whether their technical data explain the simpler things adequately but fail to provide sufficient information as things get more complicated are related to their pay grade.

Survey Question 51

T.O.s explain the simpler things adequately but fail to provide sufficient information as things get more complicated.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C3-5

Responses to Question 51 by Pay Grade and
Results of Kruskal-Wallis Test
(N = 539, $\alpha = .05$)

Pay Grade	Responses					Row Total	Mean Rank
	a	b	c	d	e		
E1	1 (20.0)	0 (0.0)	3 (60.0)	1 (20.0)	0 (0.0)	5 (100.0)	298.44
E2	3 (5.5)	17 (30.9)	26 (47.3)	9 (16.4)	0 (0.0)	55 (100.0)	299.04
E3	30 (17.6)	52 (30.6)	51 (30.0)	35 (20.6)	2 (1.2)	170 (100.0)	269.90
E4	20 (15.9)	54 (42.9)	26 (20.6)	25 (19.8)	1 (0.8)	126 (100.0)	253.09
E5	18 (20.0)	37 (41.1)	16 (17.8)	18 (20.0)	1 (1.1)	90 (100.0)	244.18
E6	5 (7.7)	26 (40.0)	11 (16.9)	21 (32.3)	2 (3.1)	65 (100.0)	303.36
E7	2 (7.1)	11 (39.3)	3 (10.7)	11 (39.3)	1 (3.6)	28 (100.0)	316.16
Column Total	79 (14.7)	197 (36.5)	136 (25.2)	120 (22.3)	7 (1.3)	539 (100.0)	

Computed $\chi^2 = 12.389$, $df = 6$, $p = .054$

Statistical Hypothesis 3-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their pay grade.

Survey Question 56

T.O.s present adequate troubleshooting information for me to quickly correct malfunctions.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C3-6

Responses to Question 56 by Pay Grade and
Results of Kruskal-Wallis Test
(N = 536, $\alpha = .05$)

Pay Grade	Responses					Row Total	Mean Rank
	a	b	c	d	e		
E1	0 (0.0)	0 (0.0)	2 (40.0)	3 (60.0)	0 (0.0)	5 (100.0)	351.25
E2	0 (0.0)	14 (25.5)	30 (54.5)	9 (16.4)	2 (3.6)	55 (100.0)	225.56
E3	4 (2.4)	40 (23.5)	64 (37.6)	47 (27.6)	15 (8.8)	170 (100.0)	256.75
E4	2 (1.6)	28 (22.6)	33 (26.6)	37 (29.8)	24 (19.4)	124 (100.0)	293.27
E5	2 (2.2)	24 (27.0)	18 (20.2)	32 (36.0)	13 (14.6)	89 (100.0)	282.09
E6	0 (0.0)	21 (32.3)	10 (15.4)	29 (44.6)	5 (7.7)	65 (100.0)	273.98
E7	0 (0.0)	9 (32.1)	6 (21.4)	11 (39.3)	2 (7.1)	28 (100.0)	263.77
Column Total	8 (1.5)	136 (25.4)	163 (30.4)	168 (31.3)	61 (11.4)	536 (100.0)	

Computed $\chi^2 = 12.220$, $df = 6$, $p = .057$

Research Hypothesis 4

Maintenance technicians' perceptions of the adequacy of their technical data are related to their maintenance experience.

Statistical Hypothesis 4-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their maintenance experience.

Survey Question 29

Are the T.O.s which you use up-to-date, accurate, and compatible with the equipment which you maintain?

- a. Yes
- b. Yes--most are with the exceptions of some T.O.s
- c. No--but it does not affect my work
- d. No--and this causes me a great deal of trouble

Table C4-1

Responses to Question 29 by Maintenance Experience
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Maint. Exp.	Responses				Row Total	Mean Rank
	a	b	c	d		
LT 2	130 (69.9)	40 (21.5)	6 (3.2)	10 (5.4)	186 (100.0)	264.92
2-4	71 (64.5)	30 (27.3)	1 (0.9)	8 (7.3)	110 (100.0)	278.37
4-6	44 (67.7)	19 (29.2)	1 (1.5)	1 (1.5)	65 (100.0)	265.54
6-8	21 (61.8)	12 (35.3)	0 (0.0)	1 (2.9)	34 (100.0)	280.56
8-10	15 (53.6)	10 (35.7)	2 (7.1)	1 (3.6)	28 (100.0)	307.04
10-12	19 (70.4)	7 (25.9)	0 (0.0)	1 (3.7)	27 (100.0)	259.72
12-14	14 (63.6)	6 (27.3)	0 (0.0)	2 (9.1)	22 (100.0)	281.68
14-16	19 (86.4)	2 (9.1)	1 (4.5)	0 (0.0)	22 (100.0)	219.57
GT 16	30 (65.2)	12 (26.1)	1 (2.2)	3 (6.5)	46 (100.0)	276.92
Column Total	363 (67.2)	138 (25.6)	12 (2.2)	27 (5.0)	540 (100.0)	

Computed $\chi^2 = 7.247$, $df = 9$, $p = .510$

Statistical Hypothesis 4-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their maintenance experience.

Survey Question 33

In your opinion, how good are T.O.s as a training device?

- a. No improvement needed
- b. Should be improved
- c. Handier if training information were in one book and the work information in another.

Table C4-2

Responses to Question 33 by Maintenance Experience
and Results of Chi Square Test*
(N = 340, $\alpha = .05$)

Maint. Exp.	Responses			Row Total
	a	b	c	
LT 2	52 (28.1)	84 (45.4)	49 (26.5)	185 (100.0)
2-4	21 (19.1)	58 (52.7)	31 (28.2)	110 (100.0)
4-6	17 (26.2)	33 (50.8)	15 (23.0)	65 (100.0)
6-10	12 (19.0)	38 (60.3)	13 (20.7)	63 (100.0)
10-14	21 (42.9)	21 (42.9)	7 (14.2)	49 (100.0)
GT 14	12 (17.6)	37 (54.4)	19 (28.0)	68 (100.0)
Column Total	135 (25.0)	271 (50.2)	134 (24.3)	540 (100.0)

Computed $\chi^2 = 17.633$, $df = 10$, $p = .062$

*Note: Some maintenance experience categories were combined to meet cell size criteria for the Chi Square test.

Statistical Hypothesis 4-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their maintenance experience.

Survey Question 48

It is very difficult to find the information I need.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C4-3

Responses to Question 48 by Maintenance Experience
and Results of Kruskal-Wallis Test
(N = 541, $\alpha = .05$)

Maint. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT 2	20 (10.8)	44 (23.8)	29 (15.7)	81 (43.8)	11 (5.9)	185 (100.0)	272.65
2-4	13 (11.7)	32 (28.8)	20 (18.0)	39 (35.1)	7 (6.3)	111 (100.0)	252.55
4-6	6 (9.2)	13 (20.0)	8 (12.3)	36 (55.4)	2 (3.1)	65 (100.0)	290.12
6-8	3 (8.8)	9 (26.5)	5 (14.7)	16 (47.1)	1 (2.9)	34 (100.0)	270.18
8-10	4 (13.8)	4 (13.8)	7 (24.1)	12 (41.4)	2 (6.9)	29 (100.0)	276.16
10-12	3 (11.1)	8 (29.6)	4 (14.8)	10 (37.0)	2 (7.4)	27 (100.0)	259.26
12-14	4 (18.2)	5 (22.7)	3 (13.6)	8 (36.4)	2 (9.1)	22 (100.0)	256.34
14-16	1 (4.5)	5 (22.7)	3 (13.6)	12 (54.5)	1 (4.5)	22 (100.0)	299.59
GT 16	7 (15.2)	7 (15.2)	5 (10.9)	27 (58.7)	0 (0.0)	46 (100.0)	279.47
Column Total	61 (11.3)	127 (23.5)	84 (15.5)	241 (44.5)	28 (5.2)	541 (100.0)	

Computed $\chi^2 = 4.242$, $df = 9$, $p = .835$

Statistical Hypothesis 4-4

Maintenance technicians' perceptions of whether their technical data are too big and thick to use on the job are related to their maintenance experience.

Survey Question 50

T.O.s are too big and thick to use on my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C4-4

Responses to Question 50 by Maintenance Experience
and Results of Kruskal-Wallis Test
(N = 542, $\alpha = .05$)

Maint. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT 2	21 (11.3)	50 (26.9)	33 (17.7)	73 (39.2)	9 (4.8)	186 (100.0)	265.77
2-4	11 (9.9)	40 (36.0)	15 (13.5)	40 (36.0)	5 (4.5)	111 (100.0)	252.66
4-6	12 (18.5)	17 (26.2)	12 (18.5)	21 (32.3)	3 (4.6)	65 (100.0)	239.88
6-8	3 (8.8)	7 (20.6)	2 (5.9)	17 (50.0)	5 (14.7)	34 (100.0)	322.12
8-10	1 (3.4)	9 (31.0)	2 (6.9)	12 (41.4)	5 (17.2)	29 (100.0)	316.07
10-12	3 (11.1)	6 (22.2)	2 (7.4)	15 (55.6)	1 (3.7)	27 (100.0)	292.93
12-14	3 (13.6)	2 (9.1)	3 (13.6)	13 (59.1)	1 (4.5)	22 (100.0)	309.93
14-16	1 (4.5)	8 (36.4)	1 (4.5)	11 (50.0)	1 (4.5)	22 (100.0)	285.20
GT 16	5 (10.9)	10 (21.7)	6 (13.0)	25 (54.3)	0 (0.0)	46 (100.0)	281.79
Column Total	60 (11.1)	149 (27.5)	76 (14.0)	227 (41.9)	30 (5.5)	542 (100.0)	

Computed $\chi^2 = 13.980$, $df = 9$, $p = .082$

Statistical Hypothesis 4-5

Maintenance technicians' perceptions of whether their technical data explain the simpler things adequately but fail to provide sufficient information as things get more complicated are related to their maintenance experience.

Survey Question 51

T.O.s explain the simpler things adequately but fail to provide sufficient information as things get more complicated.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C4-5

Responses to Question 51 by Maintenance Experience
and Results of Kruskal-Wallis Test
(N = 542, $\alpha = 0.5$)

Maint. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT 2	23 (12.4)	55 (29.6)	67 (36.0)	39 (21.0)	2 (1.1)	186 (100.0)	288.08
2-4	20 (18.0)	46 (41.4)	24 (21.6)	20 (18.0)	1 (0.9)	111 (100.0)	246.75
4-6	15 (23.1)	22 (33.8)	17 (26.2)	11 (16.9)	0 (0.0)	65 (100.0)	240.82
6-8	5 (14.7)	20 (58.8)	4 (11.8)	4 (11.8)	1 (2.9)	34 (100.0)	223.68
8-10	5 (17.2)	14 (48.3)	4 (13.8)	6 (20.7)	0 (0.0)	29 (100.0)	239.38
10-12	4 (14.8)	7 (25.9)	6 (22.2)	9 (33.3)	1 (3.7)	27 (100.0)	307.63
12-14	1 (4.5)	8 (36.4)	7 (31.8)	6 (27.3)	0 (0.0)	22 (100.0)	306.70
14-16	2 (9.1)	10 (45.5)	2 (9.1)	8 (36.4)	0 (0.0)	22 (100.0)	289.23
GT 16	4 (8.7)	17 (37.0)	5 (10.9)	18 (39.1)	2 (4.3)	46 (100.0)	316.60
Column Total	79 (14.6)	199 (36.7)	136 (25.1)	121 (22.3)	7 (1.3)	542 (100.0)	

Computed $\chi^2 = 19.977$, $df = 9$, $p = .010$

Statistical Hypothesis 4-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their maintenance experience.

Survey Question 56

T.O.s present adequate troubleshooting information for me to quickly correct malfunctions.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C4-6

Responses to Question 56 by Maintenance Experience
and Results of Kruskal-Wallis Test
(N = 539, $\alpha = .05$)

Maint. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT 2	3 (1.6)	45 (24.2)	78 (41.9)	46 (24.7)	14 (7.5)	186 (100.0)	248.86
2-4	1 (0.9)	26 (33.4)	34 (30.6)	34 (30.6)	16 (14.4)	111 (100.0)	280.93
4-6	2 (3.2)	15 (23.8)	20 (31.7)	13 (20.6)	13 (20.6)	63 (100.0)	276.23
6-8	0 (0.0)	3 (8.8)	10 (29.4)	18 (52.9)	3 (8.8)	34 (100.0)	326.19
8-10	2 (6.9)	6 (20.7)	3 (10.3)	14 (48.3)	4 (13.8)	29 (100.0)	299.45
10-12	0 (0.0)	10 (37.0)	2 (7.4)	11 (40.7)	4 (14.8)	27 (100.0)	280.59
12-14	0 (0.0)	7 (33.3)	6 (28.6)	5 (23.8)	3 (14.3)	21 (100.0)	256.36
14-16	0 (0.0)	7 (31.8)	2 (18.2)	10 (45.5)	1 (4.5)	22 (100.0)	267.20
GT 16	0 (0.0)	17 (37.0)	6 (13.0)	20 (43.5)	3 (6.5)	46 (100.0)	261.82
Column Total	8 (1.5)	136 (25.2)	163 (30.2)	171 (31.7)	61 (11.3)	539 (100.0)	

Computed $\chi^2 = 10.79$, $df = 9$, $p = .214$

Research Hypothesis 5

Maintenance technicians' perceptions of the adequacy of their technical data are related to their supervisory experience.

Statistical Hypothesis 5-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their supervisory experience.

Survey Question 29

Are the T.O.s which you use up-to-date, accurate, and compatible with the equipment which you maintain?

- a. Yes
- b. Yes--most are with the exceptions of some T.O.s
- c. No--but it does not affect my work
- d. No--and this causes me a great deal of trouble

Table C5-1

Responses to Question 29 by Supervisory Experience
and Results of Kruskal-Wallis Test
(N = 538, $\alpha = .05$)

Super. Exp.	Responses				Row Total	Mean Rank
	a	b	c	d		
LT 2	234 (69.0)	79 (23.3)	7 (2.1)	19 (5.6)	339 (100.0)	267.63
2-4	31 (59.6)	20 (38.5)	0 (0.0)	1 (1.9)	52 (100.0)	284.98
4-6	22 (68.8)	8 (25.0)	2 (6.3)	0 (0.0)	32 (100.0)	264.97
6-8	22 (57.9)	12 (31.6)	1 (2.6)	3 (7.9)	38 (100.0)	296.91
8-10	14 (58.3)	9 (37.5)	0 (0.0)	1 (4.2)	24 (100.0)	290.31
10-12	13 (68.4)	3 (15.8)	1 (5.3)	2 (10.5)	19 (100.0)	275.00
12-14	12 (70.6)	4 (23.5)	0 (0.0)	1 (5.9)	17 (100.0)	261.24
14-16	9 (90.0)	1 (10.0)	0 (0.0)	0 (0.0)	10 (100.0)	207.05
GT 16	6 (85.7)	1 (14.3)	0 (0.0)	0 (0.0)	7 (100.0)	217.79
Column Total	363 (67.5)	137 (25.5)	11 (2.0)	27 (5.0)	538 (100.0)	

Computed $\chi^2 = 6.782$, $df = 9$, $p = .560$

Statistical Hypothesis 5-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their supervisory experience.

Survey Question 33

In your opinion, how good are T.O.s as a training device?

- a. No improvement needed
- b. Should be improved
- c. Handier if training information were in one book and the work information in another.

Table C5-2

Responses to Question 33 by Supervisory Experience
and Results of Chi Square Test*
(N = 538, $\alpha = .05$)

Super. Exp.	Responses			Row Total
	a	b	c	
LT 2	87 (25.7)	163 (48.2)	88 (26.1)	338 (100.0)
2-4	10 (19.2)	31 (59.6)	11 (21.2)	52 (100.0)
4-6	6 (18.2)	18 (54.5)	9 (27.3)	33 (100.0)
6-10	20 (32.3)	32 (51.6)	10 (16.1)	62 (100.0)
10-14	7 (19.4)	21 (58.3)	8 (22.3)	36 (100.0)
GT 14	5 (29.4)	5 (29.4)	7 (41.2)	17 (100.0)
Column Total	135 (25.1)	270 (50.2)	133 (24.7)	538 (100.0)

Computed $\chi^2 = 10.913$, $df = 10$, $p = .364$

*Note: Some supervisory experience categories were combined to meet cell size criteria for the Chi Square test.

Statistical Hypothesis 5-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their supervisory experience.

Survey Question 48

It is very difficult to find the information I need.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C5-3

Responses to Question 48 by Supervisory Experience
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Super. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT 2	38 (11.2)	81 (23.9)	56 (16.5)	146 (43.1)	18 (5.3)	339 (100.0)	269.05
2-4	5 (9.4)	15 (28.3)	4 (7.5)	25 (47.2)	4 (7.5)	53 (100.0)	280.89
4-6	3 (9.1)	5 (15.2)	5 (15.2)	17 (51.5)	3 (9.1)	33 (100.0)	307.09
6-8	3 (7.9)	14 (36.8)	8 (21.1)	11 (28.9)	2 (5.3)	38 (100.0)	238.55
8-10	3 (12.5)	5 (20.8)	3 (12.5)	13 (54.2)	0 (0.0)	24 (100.0)	271.60
10-12	4 (21.1)	1 (5.3)	3 (15.8)	11 (57.9)	0 (0.0)	19 (100.0)	277.03
12-14	4 (23.5)	2 (11.8)	2 (11.8)	9 (52.9)	0 (0.0)	17 (100.0)	257.18
14-16	1 (10.0)	1 (10.0)	2 (20.0)	5 (50.0)	1 (10.0)	10 (100.0)	310.95
GT 16	0 (0.0)	3 (42.9)	1 (14.3)	3 (42.9)	0 (0.0)	7 (100.0)	254.93
Column Total	61 (11.3)	127 (23.5)	84 (15.6)	240 (44.4)	28 (5.2)	540 (100.0)	

Computed $\chi^2 = 5.093$, $df = 9$, $p = .748$

Statistical Hypothesis 5-4

Maintenance technicians' perceptions of whether their technical data are too big and thick to use on the job are related to their supervisory experience.

Survey Question 50

T.O.s are too big and thick to use on my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C5-4

**Responses to Question 50 by Supervisory Experience
and Results of Kruskal-Wallis Test**

(N = 540, $\alpha = .05$)

Super. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT 2	38 (11.2)	103 (30.4)	56 (16.5)	124 (36.6)	18 (5.3)	339 (100.0)	260.10
2-4	9 (17.0)	13 (24.5)	5 (9.4)	22 (41.5)	4 (7.5)	53 (100.0)	267.08
4-6	2 (6.1)	8 (24.2)	1 (3.0)	20 (60.6)	2 (6.1)	33 (100.0)	315.86
6-8	5 (13.2)	8 (21.1)	4 (10.5)	18 (47.4)	3 (7.9)	38 (100.0)	289.13
8-10	1 (4.2)	2 (8.3)	3 (12.5)	16 (66.7)	2 (8.3)	24 (100.0)	353.42
10-12	0 (0.0)	5 (26.3)	0 (0.0)	14 (73.7)	0 (0.0)	19 (100.0)	329.53
12-14	5 (29.4)	6 (35.3)	1 (5.9)	5 (29.4)	0 (0.0)	17 (100.0)	188.53
14-16	0 (0.0)	4 (40.0)	4 (40.0)	1 (10.0)	1 (10.0)	10 (100.0)	245.65
GT 16	0 (0.0)	0 (0.0)	2 (28.6)	5 (71.4)	0 (0.0)	7 (100.0)	355.71
Column Total	60 (11.1)	149 (27.6)	76 (14.1)	225 (41.7)	30 (5.6)	540 (100.0)	

Computed $\chi^2 = 23.543$, $df = 9$, $p = .003$

Statistical Hypothesis 5-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately but fail to provide sufficient information as things get more complicated are related to their supervisory experience.

Survey Question 51

T.O.s explain the simpler things adequately but fail to provide sufficient information as things get more complicated.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C5-5

Responses to Question 51 by Supervisory Experience
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Super. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT 2	51 (15.0)	120 (35.4)	100 (29.5)	66 (19.5)	2 (0.6)	339 (100.0)	267.72
2-4	11 (20.8)	23 (43.4)	7 (13.2)	10 (18.9)	2 (3.8)	53 (100.0)	241.71
4-6	6 (18.2)	14 (42.4)	7 (21.2)	6 (18.2)	0 (0.0)	33 (100.0)	243.08
6-8	6 (15.8)	13 (34.2)	8 (21.1)	9 (23.7)	2 (5.3)	38 (100.0)	281.37
8-10	0 (0.0)	13 (54.2)	4 (16.7)	7 (29.2)	0 (0.0)	24 (100.0)	293.25
10-12	0 (0.0)	4 (21.1)	4 (21.1)	10 (52.6)	1 (5.3)	19 (100.0)	389.00
12-14	5 (29.4)	4 (23.5)	2 (11.8)	6 (35.3)	0 (0.0)	17 (100.0)	262.29
14-16	0 (0.0)	4 (40.0)	1 (10.0)	5 (50.0)	0 (0.0)	10 (100.0)	343.75
GT 16	0 (0.0)	4 (57.1)	1 (14.3)	2 (28.6)	0 (0.0)	7 (100.0)	287.50
Column Total	79 (14.6)	199 (36.9)	134 (24.8)	121 (22.4)	7 (1.3)	540 (100.0)	

Computed $\chi^2 = 18.223$, $df = 9$, $p = .020$

Statistical Hypothesis 5-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their supervisory experience.

Survey Question 56

T.O.s present adequate troubleshooting information for me to quickly correct malfunctions.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C5-6

Responses to Question 56 by Supervisory Experience
and Results of Kruskal-Wallis Test
(N = 537, $\alpha = .05$)

Super. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT 2	7 (2.1)	79 (23.5)	128 (38.1)	87 (25.9)	35 (10.4)	336 (100.0)	259.25
2-4	0 (0.0)	11 (20.8)	11 (20.8)	18 (34.0)	13 (24.5)	53 (100.0)	321.10
4-6	1 (3.0)	7 (21.2)	5 (15.2)	18 (54.5)	2 (6.1)	33 (100.0)	295.82
6-8	0 (0.0)	11 (28.9)	4 (10.5)	16 (42.1)	7 (18.4)	38 (100.0)	305.17
8-10	0 (0.0)	7 (29.2)	4 (16.7)	13 (54.2)	0 (0.0)	24 (100.0)	272.85
10-12	0 (0.0)	10 (52.6)	3 (15.8)	5 (26.3)	1 (5.3)	19 (100.0)	206.16
12-14	0 (0.0)	3 (17.6)	5 (29.4)	6 (35.3)	3 (17.6)	17 (100.0)	308.50
14-16	0 (0.0)	6 (60.0)	0 (0.0)	4 (40.0)	0 (0.0)	10 (100.0)	203.10
GT 16	0 (0.0)	2 (28.6)	2 (28.6)	3 (42.9)	0 (0.0)	7 (100.0)	254.86
Column Total	8 (1.5)	136 (25.3)	162 (30.2)	170 (31.7)	61 (11.4)	537 (100.0)	

Computed $\chi^2 = 17.674$, $df = 9$, $p = .024$

Research Hypothesis 6

Maintenance technicians' perceptions of the adequacy of their technical data are related to their weapon system.

Statistical Hypothesis 6-1

Maintenance technicians' perceptions of their technical data with respect to currency, accuracy, and compatibility with equipment maintained are related to their weapon system.

Survey Question 29

Are the T.O.s which you use up-to-date, accurate, and compatible with the equipment which you maintain?

- a. Yes
- b. Yes--most are with the exceptions of some T.O.s
- c. No--but it does not affect my work
- d. No--and this causes me a great deal of trouble

Table C6-1

Responses to Question 29 by Weapon System
and Results of Kruskal-Wallis Test
(N = 538, $\alpha = .05$)

Weapon System	Responses				Row Total	Mean Rank
	a	b	c	d		
C-130	66 (66.7)	27 (27.3)	2 (2.0)	4 (4.0)	99 (100.0)	272.30
M III	64 (73.6)	16 (18.4)	2 (2.3)	5 (5.7)	87 (100.0)	255.38
B-52/ KC-135	67 (67.6)	25 (25.3)	2 (2.0)	5 (5.1)	99 (100.0)	269.26
C-5	63 (64.9)	28 (28.9)	2 (2.1)	4 (4.1)	97 (100.0)	275.25
RF-4	55 (73.3)	13 (17.3)	1 (1.3)	6 (8.0)	75 (100.0)	257.36
F-15	47 (58.0)	29 (35.8)	2 (2.5)	3 (3.7)	81 (100.0)	292.50
Column Total	362 (67.3)	138 (25.7)	11 (2.0)	27 (5.0)	538 (100.0)	

Computed $\chi^2 = 4.517$, $df = 5$, $p = .478$

Statistical Hypothesis 6-2

Maintenance technicians' perceptions of how good their T.O.s are as a training device are related to their weapon system.

Survey Question 33

In your opinion, how good are T.O.s as a training device?

- a. No improvement needed
- b. Should be improved
- c. Handier if training information were in one book and the work information in another.

Table C6-2

Responses to Question 33 by Weapon System
and Results of Chi Square Test
(N = 539, $\alpha = .05$)

Weapon System	Responses			Row Total
	a	b	c	
C-130	20 (20.4)	47 (48.0)	31 (31.6)	98 (100.0)
M III	26 (29.9)	39 (44.8)	22 (25.3)	87 (100.0)
B-52/ KC-135	26 (26.3)	55 (55.6)	18 (18.1)	99 (100.0)
C-5	27 (27.6)	48 (49.0)	23 (23.4)	98 (100.0)
RF-4	15 (19.7)	45 (59.2)	16 (21.1)	76 (100.0)
F-15	21 (25.9)	37 (45.7)	23 (28.4)	81 (100.0)
Column Total	135 (25.0)	271 (50.3)	133 (24.7)	539 (100.0)

Computed $\chi^2 = 10.129$, $df = 10$, $p = .429$

Statistical Hypothesis 6-3

Maintenance technicians' perceptions of whether it is very difficult to find needed information in their technical data are related to their weapon system.

Survey Question 48

It is very difficult to find the information I need.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

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AN ANALYSIS OF THE RELATIONSHIPS BETWEEN DEMOGRAPHIC FACTORS AN--ETC(U)
SEP 79 J A ALMEIDA , R L HARVEY
UNCLASSIFIED AFIT-LSSR-5-79B NL

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL--ETC F/G 5/10
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Table C6-3

Responses to Question 48 by Weapon System
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Weapon System	Responses					Row Total	Mean Rank
	a	b	c	d	e		
C-130	12 (12.1)	29 (29.3)	16 (16.2)	36 (36.4)	6 (6.1)	99 (100.0)	250.29
M III	7 (8.0)	17 (19.5)	14 (16.1)	45 (51.7)	4 (4.6)	87 (100.0)	291.54
B-52/ KC-135	12 (12.1)	20 (20.2)	16 (16.2)	45 (45.5)	6 (6.1)	99 (100.0)	276.87
C-5	15 (15.5)	23 (23.7)	14 (14.4)	39 (40.2)	6 (6.2)	97 (100.0)	258.34
RF-4	9 (11.8)	20 (26.3)	11 (14.5)	32 (42.1)	4 (5.3)	76 (100.0)	263.16
F-15	5 (6.1)	18 (22.0)	13 (15.9)	44 (53.7)	2 (2.4)	82 (100.0)	289.62
Column Total	60 (11.1)	127 (23.5)	84 (15.5)	241 (44.6)	28 (5.2)	540 (100.0)	

Computed $\chi^2 = 6.030$, $df = 5$, $p = .303$

Statistical Hypothesis 6-4

Maintenance technicians' perceptions of whether their technical data are too big and thick to use on the job are related to their weapon system.

Survey Question 50

T.O.s are too big and thick to use on my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C6-4

Responses to Question 50 by Weapon System
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Weapon System	Responses					Row Total	Mean Rank
	a	b	c	d	e		
C-130	17 (17.2)	32 (32.3)	13 (13.1)	29 (29.3)	8 (8.1)	99 (100.0)	241.40
M III	8 (9.2)	28 (32.2)	14 (16.1)	34 (39.1)	3 (3.4)	87 (100.0)	260.20
B-52/ KC-135	9 (9.1)	18 (18.2)	9 (9.1)	56 (56.6)	7 (7.1)	99 (100.0)	312.81
C-5	12 (12.4)	24 (24.7)	17 (17.5)	38 (39.2)	6 (6.2)	97 (100.0)	269.49
RF-4	10 (13.2)	23 (30.3)	9 (11.8)	31 (40.8)	3 (3.9)	76 (100.0)	257.75
F-15	4 (4.9)	23 (28.0)	14 (17.1)	38 (46.3)	3 (3.7)	82 (100.0)	285.81
Column Total	60 (11.1)	148 (27.4)	76 (14.1)	226 (41.9)	30 (5.6)	540 (100.0)	

Computed $\chi^2 = 13.712$, $df = 5$, $p = .018$

Statistical Hypothesis 6-5

Maintenance technicians' perceptions of whether their technical data explain simpler things adequately but fail to provide sufficient information as things get more complicated are related to their weapon system.

Survey Question 51

T.O.s explain the simpler things adequately but fail to provide sufficient information as things get more complicated.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C6-5

Responses to Question 51 by Weapon System
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Weapon System	Responses					Row Total	Mean Rank
	a	b	c	d	e		
C-130	15 (15.2)	44 (44.4)	23 (23.2)	16 (16.2)	1 (1.0)	99 (100.0)	250.27
M III	15 (17.2)	31 (35.6)	21 (24.1)	19 (21.8)	1 (1.1)	87 (100.0)	264.25
B-52/ KC-135	12 (12.1)	35 (35.4)	19 (19.2)	32 (32.3)	1 (1.0)	99 (100.0)	293.61
C-5	13 (13.4)	33 (34.0)	29 (29.9)	20 (20.6)	2 (2.1)	97 (100.0)	278.90
RF-4	14 (18.4)	22 (28.9)	21 (27.6)	18 (23.7)	1 (1.3)	76 (100.0)	274.52
F-15	10 (12.2)	34 (41.5)	21 (25.6)	16 (19.5)	1 (1.2)	82 (100.0)	267.09
Column Total	79 (14.6)	199 (36.9)	134 (24.8)	121 (22.4)	7 (1.3)	540 (100.0)	

Computed $\chi^2 = 4.699$, $df = 5$, $p = .454$

Statistical Hypothesis 6-6

Maintenance technicians' perceptions of their technical data with respect to the adequacy of troubleshooting information to quickly correct malfunctions are related to their weapon system.

Survey Question 56

T.O.s present adequate troubleshooting information for me to quickly correct malfunctions.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table C6-6

Responses to Question 56 by Weapon System
and Results of Kruskal-Wallis Test
(N = 538, $\alpha = .05$)

Weapon System	Responses					Row Total	Mean Rank
	a	b	c	d	e		
C-130	2 (2.0)	25 (25.3)	35 (35.4)	29 (29.3)	8 (8.1)	99 (100.0)	256.94
M III	0 (0.0)	25 (28.7)	26 (29.9)	25 (28.7)	11 (12.6)	87 (100.0)	266.81
B-52/ KC-135	1 (1.0)	23 (23.2)	28 (28.3)	39 (39.4)	8 (8.1)	99 (100.0)	277.69
C-5	2 (2.1)	23 (23.7)	30 (30.9)	29 (29.9)	13 (13.4)	97 (100.0)	273.84
RF-4	2 (2.7)	20 (26.7)	19 (25.3)	25 (33.3)	9 (12.0)	75 (100.0)	269.85
F-15	1 (1.2)	20 (24.7)	25 (30.9)	23 (28.4)	12 (14.8)	81 (100.0)	275.70
Column Total	8 (1.5)	136 (25.3)	163 (30.3)	170 (31.6)	61 (11.3)	538 (100.0)	

Computed $\chi^2 = 1.245$, $df = 5$, $p = .941$

APPENDIX D
DATA APPLICABLE TO PROPOSITION 2

INTRODUCTION

This appendix contains the research hypotheses, statistical hypotheses, survey questions, and statistical tests results associated with Proposition 2. The data presentation format will be the same as that discussed in Appendix C.

DATA PRESENTATION

Proposition 2

Maintenance technicians' perceptions of the level of writing of their technical data are related to six demographic variables (i. e., AFSC, skill level, pay grade, maintenance experience, supervisory experience, and weapon system).

Research Hypothesis 7

Maintenance technicians' perceptions of the level of writing of their technical data are related to their AFSC.

Statistical Hypothesis 7-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their AFSC.

Survey Question 34

For what level of understanding do you feel maintenance T.O.s are written?

- a. 7 skill level and above
- b. 5 skill level
- c. 3 skill level
- d. 1 skill level
- e. All skill levels

Table D7-1

Responses to Question 34 by AFSC and
Results of Chi Square Test*
(N = 507, $\alpha = .05$)

AFSC	Responses				Row Total
	a	b	c	e	
31	2 (5.7)	13 (37.1)	9 (25.7)	11 (31.5)	35 (100.0)
32	16 (14.3)	54 (48.2)	7 (6.3)	35 (31.2)	112 (100.0)
42	18 (13.3)	53 (39.3)	10 (7.4)	54 (40.0)	135 (100.0)
43	35 (19.7)	57 (32.0)	18 (10.1)	68 (38.2)	178 (100.0)
44	1 (2.1)	22 (46.8)	8 (17.0)	16 (34.1)	47 (100.0)
Column Total	72 (14.2)	199 (39.3)	52 (10.3)	184 (36.3)	507 (100.0)

Computed $\chi^2 = 30.641$, $df = 12$, $p = .002$

*Note: AFSC 34 and response category "d" were deleted to meet the cell size criteria for the Chi Square test.

Statistical Hypothesis 7-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their AFSC.

Survey Question 49

T.O.s are too complicated for me to understand.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D7-2

Responses to Question 49 by AFSC and
Results of Kruskal-Wallis Test
(N = 525, $\alpha = .05$)

AFSC	Responses					Row Total	Mean Rank
	a	b	c	d	e		
31	0 (0.0)	1 (2.7)	3 (8.1)	26 (70.3)	7 (18.9)	37 (100.0)	300.89
32	1 (0.9)	5 (4.4)	11 (9.7)	85 (75.2)	11 (9.7)	113 (100.0)	284.39
34	0 (0.0)	1 (12.5)	2 (25.0)	4 (50.0)	1 (12.5)	8 (100.0)	237.31
42	2 (1.5)	13 (9.5)	14 (10.2)	96 (70.1)	12 (8.8)	137 (100.0)	265.77
43	5 (2.7)	14 (7.7)	22 (12.1)	124 (68.1)	17 (9.3)	182 (100.0)	263.99
44	1 (2.1)	2 (4.2)	9 (18.8)	32 (66.7)	4 (8.3)	48 (100.0)	258.61
Column Total	9 (1.7)	36 (6.9)	61 (11.6)	367 (69.9)	52 (9.9)	525 (100.0)	

Computed $\chi^2 = 6.044$, $df = 5$, $p = .302$

Statistical Hypothesis 7-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their AFSC.

Survey Question 52

T.O.s should leave the theory out and just tell me how to do the job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D7-3

Responses to Question 52 by AFSC and
Results of Kruskal-Wallis Test
(N = 525, $\alpha = .05$)

AFSC	Responses					Row Total	Mean Rank
	a	b	c	d	e		
31	0 (0.0)	7 (13.9)	4 (10.3)	20 (54.1)	6 (16.2)	37 (100.0)	276.99
32	2 (1.8)	13 (11.5)	7 (6.2)	45 (39.8)	46 (40.7)	113 (100.0)	347.72
34	0 (0.0)	2 (25.0)	0 (0.0)	3 (37.5)	3 (37.5)	8 (100.0)	323.94
42	8 (5.8)	21 (15.3)	25 (18.2)	63 (46.0)	20 (14.6)	137 (100.0)	263.15
43	12 (6.6)	39 (21.4)	38 (20.9)	69 (37.9)	24 (13.2)	182 (100.0)	239.01
44	4 (8.3)	8 (16.7)	13 (27.1)	20 (41.7)	3 (6.3)	48 (100.0)	224.20
Column Total	26 (5.0)	90 (17.1)	87 (16.6)	220 (41.9)	102 (19.4)	525 (100.0)	

Computed $\chi^2 = 44.297$, $df = 5$, $p < .001$

Research Hypothesis 8

Maintenance technicians' perceptions of the level of writing of their technical data are related to their skill level.

Statistical Hypothesis 8-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their skill level.

Survey Question 34

For what level of understanding do you feel maintenance T.O.s are written?

- a. 7 skill level and above
- b. 5 skill level
- c. 3 skill level
- d. 1 skill level
- e. all skill levels

Table D8-1

Responses to Question 34 by Skill Level
and Results of Kruskal-Wallis Test
(N = 523, $\alpha = .05$)

Skill Level	Responses					Row Total
	a	b	c	d	e	
3 Level	8 (10.4)	26 (33.8)	9 (11.7)	4 (5.2)	30 (38.9)	77 (100.0)
5 Level	39 (12.9)	107 (35.4)	34 (11.3)	5 (1.7)	117 (38.7)	302 (100.0)
7 Level	25 (16.8)	74 (49.7)	12 (8.1)	1 (1.0)	37 (24.4)	149 (100.0)
Column Total	172 (13.6)	207 (39.2)	55 (10.4)	10 (1.9)	184 (34.8)	528 (100.0)

Computed $\chi^2 = 20.423$, $df = 8$, $p = .009$

Statistical Hypothesis 8-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their skill level.

Survey Question 49

T.O.s are too complicated for me to understand.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D8-2

Responses to Question 49 by Skill Level
and Results of Kruskal-Wallis Test
(N = 528, $\alpha = .05$)

Skill Level	Responses					Row Total	Mean Rank
	a	b	c	d	e		
3 Level	2 (2.6)	8 (10.4)	13 (16.9)	47 (61.0)	7 (9.1)	77 (100.0)	251.11
5 Level	5 (1.7)	22 (7.3)	40 (13.2)	202 (66.9)	33 (10.9)	302 (100.0)	269.18
7 Level	2 (1.3)	6 (4.0)	9 (6.0)	120 (80.5)	12 (8.1)	149 (100.0)	288.66
Column Total	9 (1.7)	36 (6.8)	62 (11.7)	369 (69.9)	52 (9.8)	528 (100.0)	

Computed $\chi^2 = 5.166$, $df = 2$, $p = .076$

Statistical Hypothesis 8-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their skill level.

Survey Question 52

T.O.s should leave the theory out and just tell me how to do the job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D8-3

Responses to Question 52 by Skill Level
and Results of Kruskal-Wallis Test
(N = 528, $\alpha = .05$)

Skill Level	Responses					Row Total	Mean Rank
	a	b	c	d	e		
3 Level	6 (7.8)	17 (22.1)	13 (16.9)	24 (31.2)	17 (22.1)	77 (100.0)	254.95
5 Level	14 (4.6)	53 (17.5)	57 (18.9)	119 (39.4)	59 (19.5)	302 (100.0)	268.49
7 Level	7 (4.7)	19 (12.8)	19 (12.8)	77 (51.7)	27 (18.1)	149 (100.0)	287.71
Column Total	27 (5.1)	89 (16.9)	89 (16.9)	220 (41.7)	103 (19.5)	528 (100.0)	

Computed $\chi^2 = 2.992$, $df = 2$, $p = .224$

Research Hypothesis 9

Maintenance technicians' perceptions of the level of writing of their technical data are related to their pay grade.

Statistical Hypothesis 9-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their pay grade.

Survey Question 34

For what level of understanding do you feel maintenance T.O.s are written?

- a. 7 skill level and above
- b. 5 skill level
- c. 3 skill level
- d. 1 skill level
- e. all skill levels

Pay Grade	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Total
1	1	1	1	1	1	1	1	7
2	1	1	1	1	1	1	1	7
3	1	1	1	1	1	1	1	7
4	1	1	1	1	1	1	1	7
5	1	1	1	1	1	1	1	7
6	1	1	1	1	1	1	1	7
7	1	1	1	1	1	1	1	7
8	1	1	1	1	1	1	1	7
9	1	1	1	1	1	1	1	7
10	1	1	1	1	1	1	1	7
11	1	1	1	1	1	1	1	7
12	1	1	1	1	1	1	1	7
13	1	1	1	1	1	1	1	7
14	1	1	1	1	1	1	1	7
15	1	1	1	1	1	1	1	7
16	1	1	1	1	1	1	1	7
17	1	1	1	1	1	1	1	7
18	1	1	1	1	1	1	1	7
19	1	1	1	1	1	1	1	7
20	1	1	1	1	1	1	1	7
21	1	1	1	1	1	1	1	7
22	1	1	1	1	1	1	1	7
23	1	1	1	1	1	1	1	7
24	1	1	1	1	1	1	1	7
25	1	1	1	1	1	1	1	7
26	1	1	1	1	1	1	1	7
27	1	1	1	1	1	1	1	7
28	1	1	1	1	1	1	1	7
29	1	1	1	1	1	1	1	7
30	1	1	1	1	1	1	1	7
31	1	1	1	1	1	1	1	7
32	1	1	1	1	1	1	1	7
33	1	1	1	1	1	1	1	7
34	1	1	1	1	1	1	1	7
35	1	1	1	1	1	1	1	7
36	1	1	1	1	1	1	1	7
37	1	1	1	1	1	1	1	7
38	1	1	1	1	1	1	1	7
39	1	1	1	1	1	1	1	7
40	1	1	1	1	1	1	1	7
41	1	1	1	1	1	1	1	7
42	1	1	1	1	1	1	1	7
43	1	1	1	1	1	1	1	7
44	1	1	1	1	1	1	1	7
45	1	1	1	1	1	1	1	7
46	1	1	1	1	1	1	1	7
47	1	1	1	1	1	1	1	7
48	1	1	1	1	1	1	1	7
49	1	1	1	1	1	1	1	7
50	1	1	1	1	1	1	1	7
51	1	1	1	1	1	1	1	7
52	1	1	1	1	1	1	1	7
53	1	1	1	1	1	1	1	7
54	1	1	1	1	1	1	1	7
55	1	1	1	1	1	1	1	7
56	1	1	1	1	1	1	1	7
57	1	1	1	1	1	1	1	7
58	1	1	1	1	1	1	1	7
59	1	1	1	1	1	1	1	7
60	1	1	1	1	1	1	1	7
61	1	1	1	1	1	1	1	7
62	1	1	1	1	1	1	1	7
63	1	1	1	1	1	1	1	7
64	1	1	1	1	1	1	1	7
65	1	1	1	1	1	1	1	7
66	1	1	1	1	1	1	1	7
67	1	1	1	1	1	1	1	7
68	1	1	1	1	1	1	1	7
69	1	1	1	1	1	1	1	7
70	1	1	1	1	1	1	1	7
71	1	1	1	1	1	1	1	7
72	1	1	1	1	1	1	1	7
73	1	1	1	1	1	1	1	7
74	1	1	1	1	1	1	1	7
75	1	1	1	1	1	1	1	7
76	1	1	1	1	1	1	1	7
77	1	1	1	1	1	1	1	7
78	1	1	1	1	1	1	1	7
79	1	1	1	1	1	1	1	7
80	1	1	1	1	1	1	1	7
81	1	1	1	1	1	1	1	7
82	1	1	1	1	1	1	1	7
83	1	1	1	1	1	1	1	7
84	1	1	1	1	1	1	1	7
85	1	1	1	1	1	1	1	7
86	1	1	1	1	1	1	1	7
87	1	1	1	1	1	1	1	7
88	1	1	1	1	1	1	1	7
89	1	1	1	1	1	1	1	7
90	1	1	1	1	1	1	1	7
91	1	1	1	1	1	1	1	7
92	1	1	1	1	1	1	1	7
93	1	1	1	1	1	1	1	7
94	1	1	1	1	1	1	1	7
95	1	1	1	1	1	1	1	7
96	1	1	1	1	1	1	1	7
97	1	1	1	1	1	1	1	7
98	1	1	1	1	1	1	1	7
99	1	1	1	1	1	1	1	7
100	1	1	1	1	1	1	1	7

Table D9-1

Responses to Question 34 by Pay Grade
and Results of Chi Square Test*
(N = 528, $\alpha = .05$)

Pay Grade	Responses				Row Total
	a	b	c	d	
E1/E2	8 (13.8)	18 (31.0)	8 (13.8)	24 (41.4)	58 (100.0)
E3	14 (8.5)	57 (34.5)	21 (12.7)	73 (44.3)	165 (100.0)
E4	18 (14.4)	48 (38.4)	12 (9.6)	47 (37.6)	125 (100.0)
E5	19 (21.3)	39 (43.8)	6 (6.7)	25 (28.2)	89 (100.0)
E6	11 (17.2)	37 (57.8)	4 (6.3)	12 (18.7)	64 (100.0)
E7	3 (11.1)	13 (48.1)	4 (14.8)	7 (26.0)	27 (100.0)
Column Total	73 (13.8)	212 (40.2)	55 (10.4)	188 (35.6)	528 (100.0)

Computed $\chi^2 = 31.683$, $df = 15$, $p = .007$

*Note: Responses for E1s and E2s were combined and response category "d" was deleted to meet the cell size criteria for the Chi Square test.

Statistical Hypothesis 9-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their pay grade.

Survey Question 49

T.O.s are too complicated for me to understand.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D9-2

Responses to Question 49 by Pay Grade
and Results of Kruskal-Wallis Test
(N = 539, $\alpha = .05$)

Pay Grade	Responses					Row Total	Mean Rank
	a	b	c	d	e		
E1	0 (0.0)	1 (20.0)	0 (0.0)	4 (80.0)	0 (0.0)	5 (100.0)	265.56
E2	1 (1.8)	7 (12.7)	9 (16.4)	34 (61.8)	4 (7.3)	55 (100.0)	239.14
E3	3 (1.8)	11 (6.5)	27 (15.9)	113 (66.5)	16 (9.4)	170 (100.0)	261.96
E4	2 (1.6)	10 (7.9)	11 (8.7)	87 (69.0)	16 (12.7)	126 (100.0)	281.41
E5	1 (1.1)	4 (4.4)	9 (10.0)	67 (74.4)	9 (10.0)	90 (100.0)	283.66
E6	2 (3.1)	3 (4.6)	4 (6.2)	49 (75.4)	7 (10.8)	65 (100.0)	287.57
E7	0 (0.0)	1 (3.6)	4 (14.3)	21 (75.0)	2 (7.1)	28 (100.0)	273.66
Column Total	9 (1.7)	37 (6.9)	64 (11.9)	375 (69.6)	54 (10.0)	539 (100.0)	

Computed $\chi^2 = 7.187$, df = 6, p = .304

Statistical Hypothesis 9-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their pay grade.

Survey Question 52

T.O.s should leave the theory out and just tell me how to do the job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D9-3

Responses to Question 52 by Pay Grade
and Results of Kruskal-Wallis Test
(N = 539, $\alpha = .05$)

Pay Grade	Responses					Row Total	Mean Rank
	a	b	c	d	e		
E1	0 (0.0)	0 (0.0)	1 (20.0)	3 (60.0)	1 (20.0)	5 (100.0)	294.00
E2	3 (5.5)	12 (21.8)	12 (21.8)	15 (27.3)	13 (23.6)	55 (100.0)	257.36
E3	13 (7.3)	29 (17.1)	23 (13.5)	66 (38.8)	39 (22.9)	170 (100.0)	274.52
E4	2 (1.6)	24 (19.0)	28 (22.2)	51 (40.5)	21 (16.7)	126 (100.0)	264.12
E5	2 (2.2)	12 (13.3)	14 (15.6)	46 (51.1)	16 (17.8)	90 (100.0)	288.90
E6	6 (9.2)	7 (10.8)	12 (18.5)	28 (43.1)	12 (18.5)	65 (100.0)	270.11
E7	2 (7.1)	6 (21.4)	2 (7.1)	15 (53.6)	3 (10.7)	28 (100.0)	255.05
Column Total	28 (5.2)	90 (16.7)	92 (17.1)	224 (41.6)	105 (19.5)	539 (100.0)	

Computed $\chi^2 = 2.616$, $df = 6$, $p = .855$

Research Hypothesis 10

Maintenance technicians' perceptions of the level of writing of their technical data are related to their maintenance experience.

Statistical Hypothesis 10-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their maintenance experience.

Survey Question 34

For what level of understanding do you feel maintenance T.O.s are written?

- a. 7 skill level and above
- b. 5 skill level
- c. 3 skill level
- d. 1 skill level
- e. all skill levels

Table D10-1

**Responses to Question 34 by Maintenance Experience
and Results of Chi Square Test***

(N = 531, $\alpha = .05$)

Maint. Exp.	Responses				Row Total
	a	b	c	d	
LT2	18 (9.9)	60 (33.0)	26 (14.3)	78 (42.8)	182 (100.0)
2-4	11 (10.3)	48 (44.9)	7 (6.5)	41 (38.3)	107 (100.0)
4-6	12 (18.8)	20 (31.3)	9 (14.1)	23 (35.8)	64 (100.0)
6-10	12 (19.0)	29 (46.0)	2 (3.2)	20 (31.8)	63 (100.0)
10-14	10 (20.4)	22 (44.9)	6 (12.2)	11 (22.5)	49 (100.0)
GT14	11 (16.7)	35 (53.0)	5 (7.6)	15 (22.7)	66 (100.0)
Column Total	74 (13.9)	214 (40.3)	55 (10.4)	188 (35.4)	531 (100.0)

Computed $\chi^2 = 32.478$, $df = 15$, $p = .006$

*Note: Some maintenance experience categories were combined and response category "d" was deleted to meet the cell size criteria for the Chi Square test.

Maintenance technicians' perceptions of the complexity of their technical data are related to their maintenance experience.

T.O.s are too complicated for me to understand.

- Strongly agree
- Agree
- Undecided
- Disagree
- Strongly disagree

	a.	b.	c.	d.	e.
Strongly agree					
Agree					
Undecided					
Disagree					
Strongly disagree					
Total					

Table D10-2

Responses to Question 49 by Maintenance Experience
and Results of Kruskal-Wallis Test
(N = 542, $\alpha = .05$)

Maint. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT 2	4 (2.2)	16 (8.6)	28 (15.1)	118 (63.4)	20 (10.8)	186 (100.0)	259.77
2-4	0 (0.0)	7 (6.3)	13 (11.7)	81 (73.0)	10 (9.0)	111 (100.0)	275.95
4-6	2 (3.1)	5 (7.7)	6 (9.2)	43 (66.2)	9 (13.8)	65 (100.0)	279.06
6-8	0 (0.0)	3 (8.8)	3 (8.8)	25 (73.5)	3 (8.8)	34 (100.0)	275.10
8-10	1 (3.4)	1 (3.4)	3 (10.3)	23 (79.3)	1 (3.4)	29 (100.0)	264.57
10-12	1 (3.7)	2 (7.4)	1 (3.7)	20 (74.1)	3 (11.1)	27 (100.0)	284.30
12-14	1 (4.5)	1 (4.5)	1 (4.5)	15 (68.2)	4 (18.2)	22 (100.0)	303.00
14-16	0 (0.0)	1 (4.5)	1 (4.5)	19 (86.4)	1 (4.5)	22 (100.0)	286.93
GT16	0 (0.0)	1 (2.2)	8 (17.4)	34 (23.9)	3 (6.5)	46 (100.0)	269.25
Column Total	9 (1.7)	37 (6.8)	64 (11.8)	378 (69.7)	54 (10.0)	542 (100.0)	

Computed $\chi^2 = 4.033$, $df = 8$, $p = .854$

Statistical Hypothesis 10-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their maintenance experience.

Survey Question 52

T.O.s should leave the theory out and just tell me how to do the job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D10-3

Responses to Question 52 by Maintenance Experience
and Results of Kruskal-Wallis Test
(N = 542, $\alpha = .05$)

Maint. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT2	15 (8.1)	36 (19.4)	26 (14.0)	66 (35.5)	43 (23.1)	186 (100.0)	267.05
2-4	2 (1.8)	17 (15.3)	23 (20.7)	51 (45.9)	18 (16.2)	111 (100.0)	274.44
4-6	1 (1.5)	12 (18.5)	17 (26.2)	19 (29.2)	16 (24.6)	65 (100.0)	272.64
6-8	1 (2.9)	7 (20.6)	6 (17.6)	14 (41.2)	6 (17.6)	34 (100.0)	264.96
8-10	0 (0.0)	2 (6.9)	5 (17.2)	17 (58.6)	5 (17.2)	29 (100.0)	308.34
10-12	0 (0.0)	2 (7.4)	2 (7.4)	18 (66.7)	5 (18.5)	27 (100.0)	324.81
12-14	1 (4.5)	3 (13.6)	6 (27.3)	10 (45.5)	2 (9.1)	22 (100.0)	247.93
14-16	3 (13.6)	3 (13.6)	4 (13.2)	10 (45.4)	2 (9.1)	22 (100.0)	234.20
GT16	5 (10.9)	9 (19.6)	3 (6.5)	21 (45.7)	8 (17.4)	46 (100.0)	260.21
Column Total	28 (5.2)	91 (16.8)	92 (17.0)	226 (41.7)	105 (19.4)	542 (100.0)	

Computed $\chi^2 = 7.657$, $df = 8$, $p = .468$

Research Hypothesis 11

Maintenance technicians' perceptions of the level of writing of their technical data are related to their supervisory experience.

Statistical Hypothesis 11-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their supervisory experience.

Survey Question 34

For what level of understanding do you feel maintenance T.O.s are written?

- a. 7 skill level and above
- b. 5 skill level
- c. 3 skill level
- d. 1 skill level
- e. all skill levels

Table D11-1

Responses to Question 34 by Supervisory Experience
and Results of Chi Square Test*
(N = 529, $\alpha = .05$)

Super. Exp.	Responses				Row Total
	a	b	c	e	
LT2	39 (11.7)	120 (36.1)	42 (12.7)	131 (39.5)	332 (100.0)
2-4	9 (17.6)	20 (39.2)	3 (5.9)	19 (37.3)	51 (100.0)
4-6	7 (21.2)	16 (48.5)	1 (3.0)	9 (27.3)	33 (100.0)
6-10	11 (17.7)	32 (51.6)	6 (9.7)	13 (21.0)	62 (100.0)
GT10	8 (15.7)	26 (51.0)	3 (5.9)	14 (27.4)	51 (100.0)
Column Total	74 (14.0)	214 (40.5)	55 (10.4)	186 (35.2)	529 (100.0)

Computed $\chi^2 = 21.196$, $df = 12$, $p = .048$

*Note: Some Supervisory Experience categories were combined and response category "d" was deleted to meet the cell size criteria for the Chi Square test.

Statistical Hypothesis 11-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their supervisory experience.

Survey Question 49

T.O.s are too complicated for me to understand.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D11-2

Responses to Question 49 by Supervisory Experience
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Super. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT2	5 (1.5)	23 (6.8)	46 (13.6)	228 (67.3)	37 (10.9)	339 (100.0)	269.70
2-4	2 (3.8)	6 (11.3)	4 (7.5)	35 (66.0)	6 (11.3)	53 (100.0)	265.42
4-6	0 (0.0)	2 (6.1)	2 (6.1)	28 (84.8)	1 (3.0)	33 (100.0)	276.20
6-8	1 (2.6)	2 (5.3)	2 (5.3)	29 (76.3)	4 (10.5)	38 (100.0)	288.57
8-10	1 (4.2)	1 (4.2)	2 (8.3)	18 (75.0)	2 (8.3)	24 (100.0)	275.50
10-12	0 (0.0)	1 (5.3)	0 (0.0)	17 (89.5)	1 (5.3)	19 (100.0)	296.58
12-14	0 (0.0)	1 (5.9)	2 (11.8)	12 (70.6)	2 (11.8)	17 (100.0)	282.94
14-16	0 (0.0)	0 (0.0)	5 (50.0)	4 (40.0)	1 (10.0)	10 (100.0)	210.60
GT16	0 (0.0)	0 (0.0)	1 (14.3)	6 (85.7)	0 (0.0)	7 (100.0)	267.93
Column Total	9 (1.7)	36 (6.7)	64 (11.9)	377 (69.8)	54 (10.0)	540 (100.0)	

Computed $\chi^2 = 4.128$, $df = 8$, $p = .845$

Statistical Hypothesis 11-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their supervisory experience.

Survey Question 52

T.O.s should leave the theory out and just tell me how to do the job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D11-3

Responses to Question 52 by Supervisory Experience
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Super. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT2	17 (5.0)	65 (19.2)	56 (16.5)	129 (38.1)	72 (21.2)	339 (100.0)	270.61
2-4	1 (1.9)	6 (11.3)	12 (22.6)	24 (45.3)	10 (18.9)	53 (100.0)	285.52
4-6	1 (3.0)	4 (12.1)	7 (21.2)	17 (51.5)	4 (12.1)	33 (100.0)	271.08
6-8	2 (5.3)	7 (18.4)	5 (13.2)	19 (50.0)	5 (13.2)	38 (100.0)	262.89
8-10	0 (0.0)	3 (12.5)	4 (16.7)	11 (45.8)	6 (25.0)	24 (100.0)	308.06
10-12	1 (5.3)	2 (10.5)	2 (10.5)	12 (63.2)	2 (10.5)	19 (100.0)	282.50
12-14	4 (23.5)	3 (17.6)	2 (11.8)	5 (29.4)	3 (17.6)	17 (100.0)	217.85
14-16	2 (20.0)	1 (10.0)	2 (20.0)	4 (40.0)	1 (10.0)	10 (100.0)	222.20
GT16	0 (0.0)	0 (0.0)	2 (28.6)	4 (57.1)	1 (14.3)	7 (100.0)	302.71
Column Total	28 (5.2)	91 (16.9)	92 (17.0)	225 (41.7)	104 (19.3)	540 (100.0)	

Computed $\chi^2 = 5.729$, $df = 8$, $p = .678$

Research Hypothesis 12

Maintenance technicians' perceptions of the level of writing of their technical data are related to their weapon system.

Statistical Hypothesis 12-1

Maintenance technicians' perceptions of the level of understanding for which their technical data are written are related to their weapon system.

Survey Question 34

For what level of understanding do you feel maintenance T.O.s are written?

- a. 7 skill level and above
- b. 5 skill level
- c. 3 skill level
- d. 1 skill level
- e. all skill levels

Table D12-1

Responses to Question 34 by Weapon System
and Results of Chi Square Test
(N = 540, $\alpha = .05$)

Weapon System	Responses					Row Total
	a	b	c	d	e	
C-130	21 (21.2)	29 (29.3)	7 (7.1)	2 (2.0)	40 (40.4)	99 (100.0)
M-III	4 (4.6)	35 (40.2)	17 (19.5)	3 (3.4)	28 (32.3)	87 (100.0)
B-52/ KC-135	13 (13.1)	38 (38.4)	7 (7.1)	3 (3.0)	38 (38.4)	99 (100.0)
C-5	14 (14.3)	36 (36.7)	9 (9.2)	0 (0.0)	39 (39.8)	98 (100.0)
RF-4	14 (18.4)	38 (50.0)	5 (6.6)	1 (1.3)	18 (23.7)	76 (100.0)
F-15	8 (9.9)	38 (46.9)	10 (12.3)	1 (1.2)	24 (29.7)	81 (100.0)
Column Total	74 (13.7)	214 (39.6)	55 (10.2)	10 (1.9)	187 (34.6)	540 (100.0)

Computed $\chi^2 = 37.884$, $df = 20$, $p = .009$

Statistical Hypothesis 12-2

Maintenance technicians' perceptions of the complexity of their technical data are related to their weapon system.

Survey Question 49

T.O.s are too complicated for me to understand.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D12-2

Responses to Question 49 by Weapon System
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Weapon System	Responses					Row Total	Mean Rank
	a	b	c	d	e		
C-130	1 (1.0)	8 (8.1)	13 (13.1)	72 (72.7)	5 (5.1)	99 (100.0)	256.78
M-III	1 (1.1)	3 (3.4)	13 (14.9)	59 (67.8)	11 (12.6)	87 (100.0)	281.04
B-52/ KC-135	1 (1.0)	5 (5.1)	10 (10.1)	69 (69.7)	14 (14.1)	99 (100.0)	291.04
C-5	3 (3.1)	9 (9.3)	10 (10.3)	65 (67.0)	10 (10.3)	97 (100.0)	264.69
RF-4	3 (3.9)	7 (9.2)	7 (9.2)	50 (65.8)	9 (11.8)	76 (100.0)	268.09
F-15	0 (0.0)	4 (4.9)	11 (13.4)	63 (76.8)	4 (4.9)	82 (100.0)	267.15
Column Total	9 (1.7)	36 (6.7)	64 (11.9)	378 (70.0)	53 (9.8)	540 (100.0)	

Computed $\chi^2 = 4.620$, $df = 5$, $p = .464$

Statistical Hypothesis 12-3

Maintenance technicians' perceptions of whether theory should be included in their technical data are related to their weapon system.

Survey Question 52

T.O.s should leave the theory out and just tell me how to do the job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table D12-3

Responses to Question 52 by Weapon System
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Weapon System	Responses					Row Total	Mean Rank
	a	b	c	d	e		
C-130	5 (5.1)	25 (25.3)	19 (19.2)	38 (38.4)	12 (12.1)	99 (100.0)	240.18
M-III	4 (4.6)	14 (16.1)	19 (21.8)	40 (40.6)	10 (11.5)	87 (100.0)	254.24
B-52/ KC-135	7 (7.1)	16 (16.2)	12 (12.1)	43 (43.4)	21 (21.2)	99 (100.0)	277.93
C-5	7 (7.2)	13 (13.4)	15 (15.5)	37 (38.1)	25 (25.8)	97 (100.0)	286.62
RF-4	3 (3.9)	10 (13.2)	12 (15.8)	34 (44.2)	17 (22.4)	76 (100.0)	291.22
F-15	2 (2.4)	13 (15.9)	15 (18.3)	34 (41.5)	18 (22.0)	82 (100.0)	284.47
Column Total	28 (5.2)	91 (16.9)	92 (17.0)	226 (41.9)	103 (19.1)	540 (100.0)	

Computed $\chi^2 = 8.716$, $df = 5$, $p = .121$

APPENDIX E
DATA APPLICABLE TO PROPOSITION 3

INTRODUCTION

This appendix contains the research hypotheses, statistical hypotheses, survey questions, and statistical tests results associated with Proposition 3. The data presentation format will be the same as that discussed in Appendix C.

DATA PRESENTATION

Proposition 3

Maintenance technicians' perceptions of the usage of their technical data are related to six demographic variables (i. e., AFSC, skill level, pay grade, maintenance experience, supervisory experience, and weapon system).

Research Hypothesis 13

Maintenance technicians' perceptions of the usage of their technical data are related to their AFSC.

Statistical Hypothesis 13-1

Maintenance technicians' perceptions of the primary purpose for which they use technical data are related to their AFSC.

Survey Question 30

For what primary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)

- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E 13-1

Responses to Question 30 by AFSC
and Results of Chi Square Test
(N = 498, $\alpha = .05$)

AFSC	Responses						Row Total
	a	b	c	d	e	f	
31	4 (12.1)	6 (18.2)	14 (42.4)	6 (18.2)	2 (6.1)	1 (3.0)	33 (100.0)
32	21 (18.9)	18 (16.2)	35 (31.5)	34 (30.6)	2 (1.8)	1 (1.0)	111 (100.0)
42	7 (5.2)	26 (19.4)	36 (26.9)	24 (17.9)	28 (20.9)	13 (9.7)	134 (100.0)
43	24 (13.7)	31 (17.7)	76 (43.4)	9 (5.1)	15 (8.6)	20 (11.5)	175 (100.0)
44	12 (26.7)	7 (15.6)	19 (42.2)	2 (4.4)	2 (4.4)	3 (6.7)	45 (100.0)
Column Total	68 (13.7)	88 (17.7)	180 (36.1)	75 (15.1)	49 (9.8)	38 (7.6)	498 (100.0)

Computed $\chi^2 = 93.831$, $df = 20$, $p < .001$

AFSC 34 and response g were deleted to meet the cell size requirements for the Chi Square test.

Statistical Hypothesis 13-2

Maintenance technicians' perceptions of the secondary purpose for which they use technical data are related to their AFSC.

Survey Question 31

For what secondary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E 13-2

Responses to Question 31 by AFSC
and Results of Chi Square Test
(N = 519, $\alpha = .05$)

AFSC	Responses							Row Total
	a	b	c	d	e	f	g	
31	3 (8.1)	5 (13.5)	7 (18.9)	8 (21.6)	5 (13.5)	2 (5.5)	7 (18.9)	37 (100.0)
32	15 (13.3)	28 (24.8)	18 (15.9)	29 (25.7)	7 (6.2)	12 (10.6)	4 (3.5)	113 (100.0)
42	27 (19.6)	17 (12.3)	27 (19.6)	23 (16.7)	23 (16.7)	17 (12.3)	4 (2.8)	138 (100.0)
43	51 (28.0)	36 (19.8)	20 (11.0)	21 (11.5)	23 (12.6)	21 (11.5)	10 (5.6)	182 (100.0)
44	11 (22.4)	8 (16.3)	3 (6.1)	13 (26.5)	8 (16.3)	2 (4.1)	4 (8.3)	49 (100.0)
Column Total	107 (20.6)	94 (18.1)	75 (14.5)	94 (18.1)	66 (12.7)	54 (10.4)	29 (5.6)	519 (100.0)

Computed $X^2 = 58.624$, $df = 24$, $p < .001$

AFSC 34 was deleted to meet the cell size requirements for the Chi Square test.

Research Hypothesis 14

Maintenance technicians' perceptions of the usage of their technical data are related to their skill level.

Statistical Hypothesis 14-1

Maintenance technicians' perceptions of the primary purpose for which they use technical data are related to their skill level.

Survey Question 30

For what primary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E14-1

Responses to Question 30 by Skill Level
and Results of Chi Square Test
(N = 530, $\alpha = .05$)

Skill Level	Responses							Row Total
	a	b	c	d	e	f	g	
3 Level	22 (25.6)	14 (18.2)	29 (37.7)	7 (9.1)	3 (3.8)	1 (1.3)	1 (1.3)	77 (100.0)
5 Level	27 (8.9)	49 (16.1)	109 (35.9)	48 (15.8)	36 (11.8)	23 (7.6)	12 (3.9)	304 (100.0)
7 Level	17 (11.4)	28 (18.8)	45 (30.2)	23 (15.4)	12 (8.1)	16 (10.7)	8 (5.4)	149 (100.0)
Column Total	66 (12.5)	91 (17.2)	183 (34.5)	78 (14.7)	51 (9.6)	40 (7.5)	21 (4.0)	530 (100.0)

Computed $\chi^2 = 35.585$, $df = 12$, $p < .001$

Statistical Hypothesis 14-2

Maintenance technicians' perceptions of the secondary purpose for which they use technical data are related to their skill level.

Survey Question 31

For what secondary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E14-2

Responses to Question 31 by Skill Level
and Results of Chi Square Test
(N = 530, $\alpha = .05$)

Skill Level	Responses							Row Total
	a	b	c	d	e	f	g	
3 Level	16 (20.8)	17 (22.1)	13 (16.9)	8 (10.4)	15 (19.5)	7 (9.0)	1 (1.3)	77 (100.0)
5 Level	59 (19.4)	48 (15.8)	32 (10.5)	72 (23.7)	43 (14.1)	32 (10.5)	18 (6.0)	304 (100.0)
7 Level	34 (22.8)	29 (19.5)	29 (19.5)	18 (12.1)	11 (7.4)	17 (11.3)	11 (7.4)	149 (100.0)
Column Total	109 (20.6)	94 (17.7)	74 (14.0)	98 (18.5)	69 (13.0)	56 (10.6)	30 (5.7)	530 (100.0)

Computed $\chi^2 = 29.101$, $df = 12$, $p = .004$

Research Hypothesis 15

Maintenance technicians' perceptions of the usage of their technical data are related to their pay grade.

Statistical Hypothesis 15-1

Maintenance technicians' perceptions of the primary purpose for which they use technical data are related to their pay grade.

Survey Question 30

For what primary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E 15-1

Responses to Question 30 by Pay Grade
and Results of Chi Square Test
(N = 541, $\alpha = .05$)

Pay Grade	Responses							Row Total
	a	b	c	d	e	f	g	
E1/E2	18 (30.0)	12 (20.0)	22 (36.6)	4 (6.7)	4 (6.7)	0 (0.0)	0 (0.0)	60 (100.0)
E3	16 (9.3)	21 (12.2)	66 (38.4)	28 (16.3)	20 (11.6)	14 (8.1)	7 (4.1)	172 (100.0)
E4	12 (9.5)	28 (22.2)	41 (32.5)	19 (15.1)	13 (10.3)	8 (6.3)	5 (4.1)	126 (100.0)
E5	12 (13.3)	13 (14.4)	30 (33.3)	17 (18.9)	6 (6.7)	9 (10.0)	3 (3.4)	90 (100.0)
E6/E7	12 (12.9)	17 (18.3)	27 (29.0)	13 (14.0)	8 (8.6)	10 (10.8)	6 (6.4)	93 (100.0)
Column Total	70 (12.9)	91 (16.8)	186 (34.4)	81 (15.0)	51 (9.4)	41 (7.6)	21 (3.9)	541 (100.0)

Computed $\chi^2 = 40.374$, $df = 24$, $p = .020$

Statistical Hypothesis 15-2

Maintenance technicians' perceptions of the secondary purpose for which they use technical data are related to their pay grade.

Survey Question 31

For what secondary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E15-2

Responses to Question 31 by Pay Grade
and Results of Chi Square Test
(N = 541, $\alpha = .05$)

Pay Grade	Responses							Row Total
	a	b	c	d	e	f	g	
E1/E2	13 (21.7)	14 (23.3)	13 (21.7)	4 (6.7)	9 (15.0)	7 (11.6)	0 (0.0)	60 (100.0)
E3	32 (18.6)	30 (17.4)	21 (12.2)	37 (21.5)	26 (15.1)	16 (9.3)	10 (5.9)	172 (100.0)
E4	27 (21.4)	17 (13.5)	10 (7.9)	33 (26.2)	18 (14.3)	16 (12.7)	5 (4.0)	126 (100.0)
E5	20 (22.2)	14 (15.6)	15 (16.7)	12 (13.3)	8 (8.9)	11 (12.2)	10 (11.1)	90 (100.0)
E6	13 (20.0)	18 (27.7)	10 (15.4)	7 (10.8)	3 (12.3)	5 (7.7)	4 (6.1)	65 (100.0)
E7	6 (21.4)	4 (14.4)	6 (21.4)	6 (21.4)	1 (3.6)	3 (10.7)	2 (7.1)	28 (100.0)
Column Total	111 (20.5)	97 (17.9)	75 (13.9)	99 (18.3)	70 (12.9)	58 (10.7)	31 (5.7)	541 (100.0)

Computed $\chi^2 = 42.316$, $df = 30$, $p = .067$

Research Hypothesis 16

Maintenance technicians' perceptions of the usage of their technical data are related to their maintenance experience.

Statistical Hypothesis 16-1

Maintenance technicians' perceptions of the primary purpose for which they use technical data are related to their maintenance experience.

Survey Question 30

For what primary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information
- f. Part number information
- g. None of the above

	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1

Table E16-1

Responses to Question 30 by Maintenance Experience
and Results of Chi Square Test
(N = 544, $\alpha = .05$)

Maint. Exp.	Responses							Row Total
	a	b	c	d	e	f	g	
LT2	33 (17.6)	26 (13.9)	73 (39.0)	23 (12.3)	21 (11.2)	8 (4.3)	3 (1.7)	187 (100.0)
2-4	13 (11.6)	21 (18.8)	32 (28.6)	17 (15.2)	9 (8.1)	12 (10.7)	8 (7.0)	112 (100.0)
4-6	3 (4.6)	17 (26.2)	24 (36.9)	12 (18.5)	4 (6.2)	5 (7.6)	0 (0.0)	65 (100.0)
6-10	7 (11.1)	6 (9.5)	23 (36.5)	12 (19.0)	7 (11.1)	6 (9.5)	2 (3.3)	63 (100.0)
10-14	6 (12.2)	9 (18.4)	16 (32.7)	7 (14.3)	3 (6.0)	4 (8.2)	4 (8.2)	49 (100.0)
GT14	8 (11.8)	14 (20.6)	19 (27.9)	10 (14.7)	7 (10.3)	6 (8.8)	4 (5.9)	68 (100.0)
Column Total	70 (12.9)	93 (17.1)	187 (34.4)	81 (14.9)	51 (9.4)	41 (7.5)	21 (3.9)	544 (100.0)

Computed $\chi^2 = 38.011$, $df = 30$, $p = .150$

Statistical Hypothesis 16-2

Maintenance technicians' perceptions of the secondary purpose for which they use technical data are related to their maintenance experience.

Survey Question 31

For what secondary purpose do you use T. O. s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E16-2

Responses to Question 31 by Maintenance Experience
and Results of Chi Square Test
(N = 544, $\alpha = .05$)

Maint. Exp.	Responses							Row Total
	a	b	c	d	e	f	g	
LT2	39 (20.8)	35 (18.7)	32 (17.1)	30 (16.0)	28 (15.0)	17 (9.1)	6 (3.3)	187 (100.0)
2-4	21 (18.8)	20 (17.9)	7 (6.3)	27 (24.1)	14 (12.5)	13 (11.6)	10 (8.8)	112 (100.0)
4-6	11 (16.9)	8 (12.3)	5 (7.7)	14 (21.5)	13 (20.0)	10 (15.4)	4 (6.2)	65 (100.0)
6-10	14 (22.2)	13 (20.6)	12 (19.0)	11 (17.4)	5 (7.9)	5 (7.9)	3 (5.0)	63 (100.0)
10-14	7 (14.3)	11 (22.5)	8 (16.3)	6 (12.2)	5 (10.2)	8 (16.3)	4 (8.2)	49 (100.0)
GT14	19 (27.9)	11 (16.2)	13 (19.0)	11 (16.2)	5 (7.4)	5 (7.4)	4 (5.9)	68 (100.0)
Column Total	111 (20.4)	98 (18.0)	77 (14.3)	99 (18.2)	70 (12.9)	58 (10.7)	31 (5.7)	544 (100.0)

Computed $\chi^2 = 35.684$, $df = 30$, $p = .219$

Research Hypothesis 17

Maintenance technicians' perceptions of the usage of their technical data are related to their supervisory experience.

Statistical Hypothesis 17-1

Maintenance technicians' perceptions of the primary purpose for which they use technical data are related to their supervisory experience.

Survey Question 30

For what primary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E17-1

Responses to Question 30 by Supervisory Experience
and Results of Chi Square Test
(N = 541, $\alpha = .05$)

Super. Exp.	Responses							Row Total
	a	b	c	d	e	f	g	
LT2	48 (14.1)	57 (16.8)	121 (35.6)	50 (14.7)	31 (9.1)	22 (6.5)	11 (3.2)	340 (100.0)
2-6	10 (11.6)	16 (18.6)	29 (33.7)	15 (17.4)	7 (8.1)	4 (4.7)	5 (5.9)	86 (100.0)
6-10	7 (11.2)	12 (19.4)	23 (37.1)	7 (11.3)	7 (11.3)	4 (6.5)	2 (3.2)	62 (100.0)
GT10	5 (9.4)	7 (13.2)	13 (24.5)	8 (15.1)	6 (11.3)	11 (20.8)	3 (5.7)	53 (100.0)
Column Total	70 (12.9)	92 (17.0)	186 (34.4)	80 (14.8)	51 (9.4)	41 (7.6)	21 (3.9)	541 (100.0)

Computed $\chi^2 = 20.694$, $df = 18$, $p = .295$

Statistical Hypothesis 17-2

Maintenance technicians' perceptions of the secondary purpose for which they use technical data are related to their supervisory experience.

Survey Question 31

For what secondary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E17-2

Responses to Question 31 by Supervisory Experience
and Results of Chi Square Test
(N = 541, $\alpha = .05$)

Super. Exp.	Responses							Row Total
	a	b	c	d	e	f	g	
LT2	67 (19.7)	6 (18.5)	43 (12.6)	64 (18.3)	49 (14.4)	39 (11.5)	15 (4.5)	340 (100.0)
2-4	12 (22.6)	4 (7.5)	6 (11.3)	13 (24.5)	7 (13.3)	4 (7.5)	7 (13.3)	53 (100.0)
4-6	6 (18.2)	6 (18.2)	6 (18.2)	6 (18.2)	3 (9.1)	3 (9.1)	3 (9.1)	33 (100.0)
6-10	11 (17.7)	15 (24.2)	14 (22.6)	10 (16.1)	4 (6.5)	5 (8.1)	3 (4.8)	62 (100.0)
GT10	14 (26.4)	9 (17.0)	7 (13.3)	6 (11.1)	7 (13.3)	7 (13.3)	3 (5.6)	53 (100.0)
Column Total	110 (20.3)	97 (17.9)	76 (14.0)	99 (18.3)	70 (12.9)	58 (10.7)	31 (5.7)	541 (100.0)

Computed $\chi^2 = 24.611$, $df = 24$, $p = .427$

Research Hypothesis 18

Maintenance technicians' perceptions of the usage of their technical data are related to their weapon system.

Statistical Hypothesis 18-1

Maintenance technicians' perceptions of the primary purpose for which they use technical data are related to their weapon system.

Survey Question 30

For what primary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E 18-1

Responses to Question 30 by Weapon System
and Results of Chi Square Test
(N = 542, $\alpha = .05$)

Weapon System	Responses							Row Total
	a	b	c	d	e	f	g	
C-130	11 (11.1)	19 (19.2)	32 (32.3)	9 (9.1)	13 (13.1)	10 (10.1)	5 (5.1)	99 (100.0)
MIII	16 (18.2)	13 (14.8)	35 (39.8)	9 (10.2)	2 (2.3)	5 (5.7)	8 (9.0)	88 (100.0)
B-52/ KC-135	14 (14.2)	12 (12.1)	31 (31.3)	21 (21.2)	11 (11.1)	8 (8.1)	2 (2.0)	99 (100.0)
C-5	9 (9.2)	26 (26.5)	33 (33.8)	4 (4.1)	12 (12.2)	12 (12.2)	2 (2.0)	98 (100.0)
RF-4	11 (14.5)	12 (15.8)	22 (28.9)	17 (22.4)	8 (10.5)	4 (5.3)	2 (2.6)	76 (100.0)
F-15	9 (11.0)	10 (12.2)	34 (41.5)	20 (24.4)	5 (6.1)	2 (2.4)	2 (2.4)	82 (100.0)
Column Total	70 (12.9)	92 (17.0)	187 (34.5)	80 (14.8)	51 (9.4)	41 (7.6)	21 (3.9)	542 (100.0)

Computed $\chi^2 = 61.836$, $df = 30$, $p = .001$

Statistical Hypothesis 18-2

Maintenance technicians' perceptions of the secondary purpose for which they use technical data are related to their weapon system.

Survey Question 31

For what secondary purpose do you use T.O.s?

- a. Training and familiarization
- b. Reference (to find out how it works or where it is located)
- c. Step-by-step performance (how to do the job)
- d. Troubleshooting
- e. Information on how to repair or replace components
- f. Part number information
- g. None of the above

Table E18-2

Responses to Question 31 by Weapon System
and Results of Chi Square Test
(N = 542, $\alpha = .05$)

Weapon System	Responses							Row Total
	a	b	c	d	e	f	g	
C-130	18 (18.2)	18 (18.2)	18 (18.2)	13 (13.1)	12 (12.1)	16 (16.2)	4 (4.0)	99 (100.0)
MHI	15 (17.0)	13 (14.8)	8 (9.1)	22 (25.0)	13 (14.8)	4 (4.5)	13 (14.8)	88 (100.0)
B-52/ KC-135	29 (29.3)	24 (24.2)	14 (14.2)	13 (13.1)	7 (7.1)	9 (9.1)	3 (3.0)	99 (100.0)
C-5	26 (26.5)	13 (13.3)	7 (7.1)	19 (19.4)	14 (14.3)	14 (14.3)	5 (5.1)	98 (100.0)
RF-4	13 (17.1)	12 (15.8)	16 (21.1)	15 (19.7)	9 (11.8)	7 (9.2)	4 (5.3)	76 (100.0)
F-15	10 (12.2)	17 (20.7)	14 (17.1)	17 (20.7)	14 (17.1)	8 (9.8)	2 (2.4)	82 (100.0)
Column Total	111 (20.5)	97 (17.9)	77 (14.2)	99 (18.3)	69 (12.7)	58 (10.7)	31 (5.7)	542 (100.0)

Computed $\chi^2 = 56.262$, $df = 30$, $p = .003$

APPENDIX F
DATA APPLICABLE TO PROPOSITION 4

INTRODUCTION

This appendix contains the research hypotheses, statistical hypotheses, survey questions, and statistical tests results¹² associated with Proposition 4. The data presentation format will be the same as that discussed in Appendix C.

DATA PRESENTATION

Proposition 4

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to six demographic variables (AFSC, skill level, pay grade, maintenance experience, supervisory experience, and weapon system).

Research Hypothesis 19

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their AFSC.

Statistical Hypothesis 19-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their AFSC.

Survey Question 26

How many times during the average work week do you refer to a maintenance T.O. in getting your job done?

¹²When the statistical tests were performed, response e to Survey Question 27 was deleted. The rationale for deleting this response was discussed in Chapter III.

- a. Less than 5 times
- b. 5-10 times
- c. 11-20 times
- d. 21-50 times
- e. More than 50 times

Table F 19-1

Responses to Question 26 by AFSC and
Results of Kruskal-Wallis Test
(N = 524, $\alpha = .05$)

AFSC	Responses					Row Total	Mean Rank
	a	b	c	d	e		
31	10 (27.0)	4 (10.8)	5 (13.5)	12 (32.4)	6 (16.2)	37 (100.0)	261.35
32	10 (8.8)	19 (16.8)	26 (23.0)	31 (27.9)	27 (23.9)	113 (100.0)	311.80
34	1 (12.5)	3 (37.5)	0 (0.0)	1 (12.5)	3 (37.5)	8 (100.0)	294.81
42	20 (14.2)	26 (19.1)	27 (19.9)	35 (25.7)	28 (20.6)	136 (100.0)	287.16
43	34 (18.8)	45 (24.5)	38 (21.0)	38 (21.0)	26 (14.4)	181 (100.0)	252.29
44	16 (32.7)	12 (24.5)	9 (18.4)	6 (12.2)	6 (12.2)	49 (100.0)	207.93
Column Total	91 (17.4)	109 (20.8)	105 (20.0)	123 (23.5)	96 (18.3)	524 (100.0)	

Computed $\chi^2 = 20.972$, $df = 5$, $p = .001$

Statistical Hypothesis 19-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their AFSC.

Survey Question 27

To what extent do you actually use the T.O. at your work station as a performance aid to tell you what to do next or what to check for in the task indicated?

- a. Always
- b. Frequently
- c. Seldom
- d. Never
- e. Use work cards

Table F19-2

Responses to Question 27 by AFSC and
Results of Kruskal-Wallis Test
(N = 489, $\alpha = .05$)

AFSC	Responses				Row Total	Mean Rank
	a	b	c	d		
31	14 (37.3)	13 (35.1)	6 (16.2)	4 (10.8)	37 (100.0)	244.04
32	32 (28.3)	60 (53.1)	17 (15.0)	4 (3.5)	113 (100.0)	237.01
34	2 (25.0)	3 (37.5)	3 (37.5)	0 (0.0)	8 (100.0)	273.50
42	33 (24.6)	65 (48.5)	31 (23.1)	5 (3.7)	134 (100.0)	258.31
43	43 (23.7)	64 (42.7)	39 (26.0)	4 (2.7)	150 (100.0)	253.22
44	9 (19.1)	21 (44.7)	13 (27.7)	4 (8.5)	47 (100.0)	287.80
Column Total	133 (19.1)	226 (46.2)	109 (22.3)	21 (4.3)	489 (100.0)	

Computed $\chi^2 = 5.219$, $df = 5$, $p = .390$

Statistical Hypothesis 19-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their job are related to their AFSC.

Survey Question 54

I rarely refer to T.O.s in doing my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table F19-3

Responses to Question 54 by AFSC and
Results of Kruskal-Wallis Test
(N = 526, $\alpha = .05$)

AFSC	Responses					Row Total	Mean Rank
	a	b	c	d	e		
31	4 (10.8)	4 (10.8)	1 (2.7)	15 (40.5)	13 (35.1)	37 (100.0)	272.40
32	4 (3.5)	10 (8.8)	3 (2.7)	52 (46.0)	44 (38.9)	113 (100.0)	320.93
34	0 (0.0)	2 (25.0)	1 (12.5)	4 (50.0)	1 (12.5)	8 (100.0)	229.44
42	8 (5.8)	17 (12.4)	10 (7.3)	74 (54.0)	28 (20.4)	137 (100.0)	263.72
43	5 (2.7)	33 (18.1)	14 (7.7)	90 (49.5)	40 (22.0)	182 (100.0)	262.48
44	3 (6.1)	14 (28.6)	4 (8.2)	19 (38.8)	9 (18.4)	49 (100.0)	224.18
Column Total	24 (4.6)	30 (15.2)	33 (6.3)	254 (48.3)	135 (25.7)	526 (100.0)	

Computed $\chi^2 = 19.815$, $df = 5$, $p = .001$

Research Hypothesis 20

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their skill level.

Statistical Hypothesis 20-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their skill level.

Survey Question 26

How many times during the average work week do you refer to a maintenance T.O. in getting your job done?

- a. Less than 5 times
- b. 5-10 times
- c. 11-20 times
- d. 21-50 times
- e. More than 50 times

Table F20-1

Responses to Question 26 by Skill Level
and Results of Kruskal-Wallis Test
(N = 527, $\alpha = .05$)

Skill Level	Responses					Row Total	Mean Rank
	a	b	c	d	e		
3 Level	15 (19.5)	16 (20.8)	15 (19.5)	17 (22.1)	14 (18.2)	77 (100.0)	261.90
5 Level	55 (18.3)	70 (23.3)	65 (21.6)	68 (22.6)	43 (14.3)	301 (100.0)	256.85
7 Level	22 (14.8)	22 (14.8)	27 (18.1)	39 (26.2)	39 (26.2)	149 (100.0)	305.15
Column Total	92 (7.5)	108 (20.5)	107 (20.3)	124 (23.5)	96 (18.2)	527 (100.0)	

Computed $\chi^2 = 10.311$, $df = 2$, $p = .006$

Statistical Hypothesis 20-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their skill level.

Survey Question 27

To what extent do you actually use the T.O. at your work station as a performance aid to tell you what to do next or what to check for in the task indicated?

- a. Always
- b. Frequently
- c. Seldom
- d. Never
- e. Use work cards

Table F20-2

Responses to Question 27 by Skill Level
and Results of Kruskal-Wallis Test
(N = 494, $\alpha = .05$)

Skill Level	Responses				Row Total	Mean Rank
	a	b	c	d		
3 Level	20 (29.0)	30 (43.5)	17 (24.6)	2 (2.9)	69 (100.0)	246.25
5 Level	64 (22.5)	139 (48.9)	67 (23.6)	14 (4.9)	284 (100.0)	265.87
7 Level	48 (34.0)	62 (44.0)	25 (17.7)	6 (4.3)	141 (100.0)	232.76
Column Total	132 (26.7)	237 (46.8)	109 (22.1)	22 (4.5)	494 (100.0)	

Computed $\chi^2 = 5.820$, $df = 2$, $p = .054$

Statistical Hypothesis 20-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their jobs are related to their skill level.

Survey Question 54

I rarely refer to T.O.s in doing my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table F20-3

Responses to Question 54 by Skill Level
and Results of Kruskal-Wallis Test
(N = 529, $\alpha = .05$)

Skill Level	Responses					Row Total	Mean Rank
	a	b	c	d	e		
3 Level	0 (0.0)	14 (18.2)	13 (16.9)	37 (48.1)	13 (16.9)	77 (100.0)	246.47
5 Level	15 (5.0)	56 (18.5)	18 (5.9)	146 (48.2)	68 (22.4)	303 (100.0)	259.51
7 Level	8 (5.4)	12 (8.1)	2 (1.3)	74 (49.7)	53 (35.6)	149 (100.0)	312.99
Column Total	23 (4.3)	82 (15.5)	33 (6.2)	257 (48.6)	134 (25.3)	529 (100.0)	

Computed $\chi^2 = 16.722$, $df = 2$, $p < .001$

Research Hypothesis 21

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their pay grade.

Statistical Hypothesis 21-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to pay grade.

Survey Question 26

How many times during the average work week do you refer to a maintenance T.O. in getting your job done?

- a. Less than 5 times
- b. 5-10 times
- c. 11-20 times
- d. 21-50 times
- e. more than 50 times

Pay Grade	Less than 5 times	5-10 times	11-20 times	21-50 times	more than 50 times
Level 1	11	11	11	11	11
Level 2	11	11	11	11	11
Level 3	11	11	11	11	11
Level 4	11	11	11	11	11
Level 5	11	11	11	11	11
Level 6	11	11	11	11	11
Level 7	11	11	11	11	11
Level 8	11	11	11	11	11
Level 9	11	11	11	11	11
Level 10	11	11	11	11	11

Table F21-1

Responses to Question 26 by Pay Grade
and Results of Kruskal-Wallis Test
(N = 538, $\alpha = .05$)

Pay Grade	Responses					Row Total	Mean Rank
	a	b	c	d	e		
E1	1 (20.0)	1 (20.0)	0 (0.0)	2 (40.0)	1 (20.0)	5 (100.0)	294.63
E2	11 (20.0)	14 (25.5)	14 (25.5)	9 (16.4)	7 (12.7)	55 (100.0)	239.86
E3	34 (20.0)	41 (24.1)	34 (20.0)	39 (22.9)	22 (12.9)	170 (100.0)	249.53
E4	22 (17.6)	27 (21.6)	28 (22.4)	26 (20.8)	22 (17.6)	125 (100.0)	265.61
E5	13 (14.4)	13 (14.4)	16 (17.8)	23 (25.6)	25 (27.8)	90 (100.0)	309.14
E6	10 (15.4)	9 (13.8)	11 (16.9)	15 (23.1)	20 (30.8)	65 (100.0)	311.74
E7	5 (17.9)	5 (17.9)	6 (21.4)	10 (35.2)	2 (7.1)	28 (100.0)	262.70
Column Total	96 (17.8)	110 (20.4)	109 (20.3)	124 (23.0)	99 (18.4)	538 (100.0)	

Computed $\chi^2 = 16.238$, df = 6, p = .013

Statistical Hypothesis 21-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their pay grade.

Survey Question 27

To what extent do you actually use the T.O. at your work station as a performance aid to tell you what to do next or what to check for in the task indicated?

- a. Always
- b. Frequently
- c. Seldom
- d. Never
- e. Use work cards

Table F21-2

Responses to Question 27 by Pay Grade
and Results of Kruskal-Wallis Test
(N = 503, $\alpha = .05$)

Pay Grade	Responses				Row Total	Mean Rank
	a	b	c	d		
E1	4 (80.0)	0 (0.0)	1 (20.0)	0 (0.0)	5 (100.0)	137.50
E2	13 (27.1)	20 (41.7)	13 (27.1)	2 (4.2)	48 (100.0)	261.64
E3	37 (23.3)	81 (50.9)	34 (21.4)	7 (4.4)	159 (100.0)	259.42
E4	24 (20.3)	58 (49.2)	31 (26.3)	5 (4.2)	118 (100.0)	272.91
E5	32 (37.2)	37 (43.0)	12 (14.0)	5 (5.8)	86 (100.0)	224.10
E6	21 (34.4)	29 (47.5)	10 (16.4)	1 (1.6)	61 (100.0)	223.44
E7	5 (19.2)	7 (26.9)	12 (46.2)	2 (7.7)	26 (100.0)	317.67
Column Total	136 (27.0)	232 (46.1)	113 (22.5)	22 (4.4)	530 (100.0)	

Computed $\chi^2 = 21.344$, $df = 5$, $p = .002$

Statistical Hypothesis 21-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their jobs are related to their pay grade.

Survey Question 54

I rarely refer to T.O.s in doing my work.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly Disagree

Table F21-3

Responses to Question 54 by Pay Grade
and Results of Kruskal-Wallis Test
(N = 540, $\alpha = .05$)

Pay Grade	Responses					Row Total	Mean Rank
	a	b	c	d	e		
E1	0 (0.0)	1 (20.0)	1 (20.0)	3 (60.0)	0 (0.0)	5 (100.0)	255.25
E2	0 (0.0)	11 (20.0)	7 (12.7)	27 (49.1)	10 (18.2)	55 (100.0)	250.79
E3	8 (4.7)	35 (20.5)	18 (10.5)	70 (40.9)	40 (23.4)	171 (100.0)	251.26
E4	8 (16.3)	21 (16.7)	4 (3.2)	68 (54.0)	25 (19.3)	126 (100.0)	258.48
E5	3 (3.3)	9 (10.0)	1 (1.1)	46 (51.1)	31 (34.4)	90 (100.0)	312.38
E6	4 (6.2)	4 (6.2)	1 (1.5)	31 (47.7)	25 (38.3)	65 (100.0)	320.35
E7	2 (7.1)	4 (14.3)	1 (3.5)	15 (53.5)	6 (21.4)	28 (100.0)	261.91
Column Total	25 (4.5)	35 (15.7)	33 (6.1)	260 (48.1)	137 (25.4)	540 (100.0)	

Computed $\chi^2 = 19.573$, $df = 5$, $p = .003$

Research Hypothesis 22

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their maintenance experience.

Statistical Hypothesis 22-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their maintenance experience.

Survey Question 26

How many times during the average work week do you refer to a maintenance T.O. in getting your job done?

- a. Less than 5 times
- b. 5-10 times
- c. 11-20 times
- d. 21-50 times
- e. More than 50 times

Table F22-1

**Responses to Question 26 by Maintenance Experience
and Results of Kruskal-Wallis Test**

(N = 541, $\alpha = .05$)

Maint. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT2	33 (17.7)	46 (24.7)	39 (21.0)	43 (23.1)	25 (13.4)	186 (100.0)	255.03
2-4	28 (25.2)	27 (24.3)	25 (22.5)	18 (16.2)	13 (11.7)	111 (100.0)	227.43
4-6	10 (15.4)	6 (9.2)	19 (29.2)	16 (24.6)	14 (21.5)	65 (100.0)	297.50
6-8	3 (8.8)	9 (26.5)	3 (8.8)	10 (29.4)	9 (26.5)	34 (100.0)	309.40
8-10	3 (10.7)	4 (14.3)	3 (10.7)	10 (35.7)	8 (28.6)	28 (100.0)	331.00
10-12	3 (11.1)	4 (14.8)	3 (11.1)	7 (25.9)	10 (37.0)	27 (100.0)	337.50
12-14	6 (27.3)	1 (4.5)	3 (13.6)	2 (9.1)	10 (45.5)	22 (100.0)	313.84
14-16	4 (18.2)	5 (22.7)	5 (22.7)	5 (22.7)	3 (13.6)	22 (100.0)	256.30
GT16	6 (13.0)	9 (19.6)	10 (21.7)	13 (28.3)	8 (17.4)	46 (100.0)	285.86
Column Total	96 (17.7)	111 (20.5)	110 (20.3)	124 (22.9)	100 (18.5)	541 (100.0)	

Computed $\chi^2 = 26.858$, $df = 8$, $p = .001$

Statistical Hypothesis 22-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their maintenance experience.

Survey Question 27

To what extent do you actually use the T.O. at your work station as a performance aid to tell you what to do next or what to check for in the task indicated?

- a. Always
- b. Frequently
- c. Seldom
- d. Never
- e. Use work cards

Table F22-2

Responses to Question 27 by Maintenance Experience
and Results of Kruskal-Wallis Test
(N = 506, $\alpha = .05$)

Maint. Exp.	Responses				Row Total	Mean Rank
	a	b	c	d		
LT2	47 (27.2)	83 (48.0)	37 (21.4)	6 (3.5)	173 (100.0)	249.95
2-4	21 (20.4)	41 (39.8)	33 (32.0)	8 (7.8)	103 (100.0)	291.29
4-6	13 (21.7)	32 (53.3)	13 (21.7)	2 (3.3)	60 (100.0)	260.31
6-8	11 (33.3)	18 (54.5)	3 (9.1)	1 (3.0)	33 (100.0)	216.18
8-10	7 (24.1)	15 (51.7)	5 (17.2)	2 (6.9)	29 (100.0)	256.64
10-12	9 (37.5)	13 (54.2)	1 (4.2)	1 (4.2)	24 (100.0)	202.67
12-14	9 (42.9)	9 (42.9)	3 (14.3)	0 (0.0)	21 (100.0)	200.21
14-16	6 (28.6)	19 (42.9)	5 (23.8)	1 (4.8)	21 (100.0)	254.64
GT16	15 (35.7)	13 (31.0)	13 (31.0)	1 (2.4)	42 (100.0)	248.02
Column Total	138 (27.3)	233 (46.0)	113 (22.3)	22 (4.3)	506 (100.0)	

Computed $\chi^2 = 17.253$, $df = 8$, $p = .028$

Statistical Hypothesis 22-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their jobs are related to their maintenance experience.

Survey Question 54

I rarely refer to T.O.s in doing my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table F22-3

Responses to Question 54 by Maintenance Experience
and Results of Kruskal-Wallis Test
(N = 543, $\alpha = .05$)

Maint. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT2	4 (2.2)	34 (18.3)	22 (11.8)	86 (46.2)	40 (21.5)	186 (100.0)	256.69
2-4	10 (8.9)	25 (22.3)	8 (7.1)	52 (46.4)	17 (15.2)	112 (100.0)	224.88
4-6	2 (3.1)	12 (18.5)	1 (1.5)	26 (40.0)	24 (36.9)	65 (100.0)	299.91
6-8	2 (5.9)	2 (5.9)	0 (0.0)	19 (55.9)	11 (32.4)	34 (100.0)	311.68
8-10	1 (3.4)	3 (10.3)	0 (0.0)	20 (69.0)	5 (17.2)	29 (100.0)	278.60
10-12	1 (3.7)	2 (7.4)	0 (0.0)	13 (48.1)	11 (40.7)	27 (100.0)	331.00
12-14	1 (4.5)	1 (4.5)	1 (4.5)	9 (40.9)	10 (45.5)	22 (100.0)	337.43
14-16	0 (0.0)	1 (4.5)	0 (0.0)	14 (63.6)	7 (31.8)	22 (100.0)	328.75
GT16	4 (8.7)	5 (10.9)	1 (2.2)	23 (50.0)	13 (28.3)	46 (100.0)	282.63
Column Total	25 (4.6)	85 (15.7)	33 (6.1)	262 (48.3)	138 (25.4)	543 (100.0)	

Computed $\chi^2 = 31.010$, $df = 8$, $p < .001$

Research Hypothesis 23

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their supervisory experience.

Statistical Hypothesis 23-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their supervisory experience.

Survey Question 26

How many times during the average work week do you refer to a maintenance T.O. in getting your job done?

- a. Less than 5 times
- b. 5-10 times
- c. 11-20 times
- d. 21-50 times
- e. More than 50 times

Table F23-1

Responses to Question 26 by Supervisory Experience
and Results of Kruskal-Wallis Test
(N = 539, $\alpha = .05$)

Super. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT2	66 (19.4)	80 (23.5)	71 (20.9)	76 (22.4)	47 (13.8)	340 (100.0)	252.54
2-4	8 (15.4)	6 (11.5)	14 (26.9)	12 (23.1)	12 (23.1)	52 (100.0)	296.67
4-6	4 (12.1)	7 (21.2)	3 (9.1)	8 (24.2)	11 (33.3)	33 (100.0)	317.82
6-8	6 (16.2)	7 (18.9)	5 (13.5)	9 (24.3)	10 (27.0)	37 (100.0)	297.24
8-10	2 (8.3)	2 (8.3)	4 (16.7)	8 (33.3)	8 (33.3)	24 (100.0)	350.79
10-12	2 (10.5)	2 (10.5)	5 (26.3)	6 (31.6)	4 (21.1)	19 (100.0)	313.50
12-14	2 (11.8)	3 (17.6)	5 (29.4)	2 (11.8)	5 (29.4)	17 (100.0)	298.94
14-16	2 (20.0)	3 (30.0)	2 (20.0)	1 (10.0)	2 (20.0)	10 (100.0)	244.05
GT16	3 (42.9)	1 (14.3)	1 (14.3)	1 (14.3)	1 (14.3)	7 (100.0)	204.43
Column Total	95 (17.6)	111 (20.6)	110 (20.4)	123 (22.8)	100 (18.6)	539 (100.0)	

Computed $\chi^2 = 20.795$, $df = 8$, $p = .008$

Statistical Hypothesis 23-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their supervisory experience.

Survey Question 27

To what extent do you actually use the T.O. at your work station as a performance aid to tell you what to do next or what to check for in the task indicated?

- a. Always
- b. Frequently
- c. Seldom
- d. Never
- e. Use work cards

Table F23-2

Responses to Question 27 by Supervisory Experience
and Results of Kruskal-Wallis Test
(N = 503, $\alpha = .05$)

Super. Exp.	Responses				Row Total	Mean Rank
	a	b	c	d		
LT2	76 (24.3)	148 (47.3)	76 (24.3)	13 (4.2)	313 (100.0)	260.71
2-4	12 (23.5)	26 (51.0)	9 (17.6)	4 (7.8)	51 (100.0)	260.75
4-6	10 (31.3)	14 (43.8)	6 (18.8)	2 (6.3)	32 (100.0)	244.50
6-8	15 (42.9)	15 (42.9)	4 (11.4)	1 (2.9)	35 (100.0)	202.14
8-10	6 (27.3)	14 (63.6)	2 (9.1)	0 (0.0)	22 (100.0)	220.14
10-12	8 (44.4)	6 (33.3)	4 (22.2)	0 (0.0)	18 (100.0)	211.00
12-14	3 (18.8)	7 (43.8)	5 (31.3)	1 (6.3)	16 (100.0)	289.31
14-16	4 (44.4)	1 (11.1)	4 (44.4)	0 (0.0)	9 (100.0)	249.44
GT16	2 (28.6)	1 (14.3)	3 (42.9)	1 (14.3)	7 (100.0)	310.50
Column Total	136 (27.0)	232 (46.1)	113 (22.5)	22 (4.4)	503 (100.0)	

Computed $\chi^2 = 11.518$, $df = 8$, $p = .174$

Statistical Hypothesis 23-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their jobs are related to their supervisory experience.

Survey Question 54

I rarely refer to T.O.s in doing my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

	a	b	c	d	e	Total
1-10	1	1	1	1	1	5
11-20	1	1	1	1	1	5
21-30	1	1	1	1	1	5
31-40	1	1	1	1	1	5
41-50	1	1	1	1	1	5
51-60	1	1	1	1	1	5
61-70	1	1	1	1	1	5
71-80	1	1	1	1	1	5
81-90	1	1	1	1	1	5
91-100	1	1	1	1	1	5
Total	10	10	10	10	10	50

Table F23-3

Responses to Question 54 by Supervisory Experience
and Results of Kruskal-Wallis Test
(N = 541, $\alpha = .05$)

Super. Exp.	Responses					Row Total	Mean Rank
	a	b	c	d	e		
LT2	13 (3.8)	63 (18.5)	30 (8.8)	160 (47.1)	74 (21.8)	340 (100.0)	256.84
2-4	5 (9.4)	8 (15.1)	1 (1.9)	26 (49.1)	13 (24.5)	53 (100.0)	264.93
4-6	2 (6.1)	4 (12.1)	0 (0.0)	17 (51.5)	10 (30.3)	33 (100.0)	294.23
6-8	1 (2.6)	1 (2.6)	0 (0.0)	22 (57.9)	14 (36.8)	38 (100.0)	335.87
8-10	1 (4.2)	1 (4.2)	1 (4.2)	8 (33.3)	13 (54.2)	24 (100.0)	357.19
10-12	0 (0.0)	0 (0.0)	0 (0.0)	14 (73.7)	5 (26.3)	19 (100.0)	327.13
12-14	2 (11.8)	3 (17.6)	0 (0.0)	7 (41.2)	5 (29.4)	17 (100.0)	266.12
14-16	0 (0.0)	2 (20.0)	1 (10.0)	6 (60.0)	1 (10.0)	10 (100.0)	238.45
GT16	1 (14.3)	2 (28.6)	0 (0.0)	2 (28.6)	2 (28.6)	7 (100.0)	235.29
Column Total	25 (4.6)	84 (15.5)	33 (6.1)	262 (48.4)	137 (25.3)	541 (100.0)	

Computed $\chi^2 = 26.696$, $df = 8$, $p = .003$

Research Hypothesis 24

Maintenance technicians' perceptions of the frequency of usage of their technical data are related to their weapon system.

Statistical Hypothesis 24-1

Maintenance technicians' perceptions of their technical data with respect to the number of times during the week in which they refer to the T.O. are related to their weapon system.

Survey Question 26

How many times during the average work week do you refer to a maintenance T.O. in getting your job done?

- a. Less than 5 times
- b. 5-10 times
- c. 11-20 times
- d. 21-50 times
- e. More than 50 times

Table F24-1

Responses to Question 26 by Weapon System
and Results of Kruskal-Wallis Test
(N = 539, $\alpha = .05$)

Weapon System	Responses					Row Total	Mean Rank
	a	b	c	d	e		
C-130	19 (19.4)	21 (21.4)	26 (26.5)	21 (21.4)	11 (11.2)	98 (100.0)	244.11
MIII	27 (30.7)	15 (17.0)	14 (15.9)	18 (20.5)	14 (15.9)	88 (100.0)	238.37
B-52/ KC-135	15 (15.2)	16 (16.2)	21 (21.2)	27 (27.3)	20 (20.2)	99 (100.0)	290.39
C-5	17 (17.5)	29 (29.9)	19 (19.6)	17 (17.5)	15 (15.5)	97 (100.0)	247.88
RF-4	10 (13.2)	12 (15.8)	15 (19.7)	16 (21.1)	23 (30.3)	76 (100.0)	310.83
F-15	6 (7.4)	18 (22.2)	15 (18.5)	25 (30.9)	17 (21.0)	81 (100.0)	306.27
Column Total	94 (17.4)	111 (20.6)	110 (20.4)	124 (23.0)	100 (18.6)	523 (100.0)	

Computed $\chi^2 = 20.328$, $df = 5$, $p = .001$

Statistical Hypothesis 24-2

Maintenance technicians' perceptions of to what extent they actually use the T.O. at their work station as a performance aid are related to their weapon system.

Survey Question 27

To what extent do you actually use the T.O. at your work station as a performance aid to tell you what to do next or what to check for in the task indicated?

- a. Always
- b. Frequently
- c. Seldom
- d. Never
- e. Use work cards

Table F24-2

Responses to Question 27 by Weapon System
and Results of Kruskal-Wallis Test
(N = 505, $\alpha = .05$)

Weapon System	Responses				Row Total	Mean Rank
	a	b	c	d		
C-130	27 (30.7)	38 (43.2)	20 (22.7)	3 (3.4)	88 (100.0)	243.62
MIII	24 (28.2)	34 (40.0)	18 (21.2)	9 (10.6)	85 (100.0)	264.72
B-52 KC-135	25 (28.4)	42 (47.7)	20 (22.7)	1 (1.1)	88 (100.0)	244.35
C-5	14 (15.2)	44 (47.8)	31 (33.7)	3 (3.3)	92 (100.0)	292.91
RF-4	23 (30.3)	35 (46.1)	15 (19.7)	3 (3.9)	76 (100.0)	242.50
F-15	24 (31.6)	40 (52.6)	9 (11.8)	3 (3.9)	76 (100.0)	226.40
Column Total	137 (27.1)	233 (46.1)	113 (22.4)	22 (4.4)	505 (100.0)	

Computed $\chi^2 = 12.603$, $df = 5$, $p = .027$

Statistical Hypothesis 24-3

Maintenance technicians' perceptions of how often they refer to their T.O.s when doing their jobs are related to their weapon system.

Survey Question 54

I rarely refer to T.O.s in doing my job.

- a. Strongly agree
- b. Agree
- c. Undecided
- d. Disagree
- e. Strongly disagree

Table F24-3

Responses to Question 54 by Weapon System
and Results of Kruskal-Wallis Test
(N = 541, $\alpha = .05$)

Weapon System	Responses					Row Total	Mean Rank
	a	b	c	d	e		
C-130	4 (4.0)	19 (19.2)	9 (9.1)	49 (49.5)	18 (18.2)	99 (100.0)	245.75
M113	8 (9.1)	18 (20.5)	5 (5.7)	33 (37.5)	24 (27.3)	88 (100.0)	254.65
B-52/ KC-135	4 (4.0)	13 (13.1)	3 (3.0)	56 (56.6)	23 (23.2)	99 (100.0)	278.81
C-5	4 (4.1)	17 (17.5)	8 (8.2)	47 (48.5)	21 (21.6)	97 (100.0)	258.66
RF-4	4 (5.3)	9 (11.8)	2 (2.6)	37 (48.7)	24 (31.6)	76 (100.0)	295.56
F-15	1 (1.2)	8 (9.8)	6 (7.3)	39 (47.6)	28 (34.1)	82 (100.0)	308.66
Column Total	25 (4.6)	84 (15.5)	33 (6.1)	261 (48.2)	138 (25.5)	541 (100.0)	

Computed $\chi^2 = 12.665$, $df = 5$, $p = .027$

SELECTED BIBLIOGRAPHY

A. REFERENCES CITED

1. Allen, R. H., and others. "A Study of the Air Force Maintenance Technical Data System." Technical documentary report No. AMRL-TDR-62-85, Behavioral Sciences Laboratory, Wright-Patterson AFB OH, 1962.
2. Bailek, Captain Stanley H., Jr., USAF, and Captain John W. Kulas, USAF. "Job Guide Versus Conventional Technical Orders from the Maintenance Technician's Perspective." Unpublished master's thesis, LSSR 30-78A, AFIT/SL, Wright-Patterson AFB OH, June 1978.
3. Bunch, Captain Steven E., USAF, Captain Charles F. Holsen, USAF, and Captain Jack S. Ward, USAF. "An Analysis of United States Air Force Maintenance Technical Data from the Maintenance Technician's Perspective." Unpublished master's thesis, LSSR 11-78A, AFIT/SL, Wright-Patterson AFB OH, June 1978.
4. Dalezman, J. J., R. C. Johnson, and D. L. Thomas. "Opinions of Air Force Maintenance Personnel About Conventional Technical Orders." Air Force Human Resources Laboratory, Air Force Systems Command, Brooks AFB TX, July 1978.
5. Jarmon, Captain Larry E., USAF, and Captain Parke R. Weaver, Jr., USAF. "An Analysis of Contextual Factors Pertinent to the Design of Performance Aids for USAF Ground Communications-Electronics-Meteorological (CEM) Equipment Maintenance." Unpublished master's thesis, SLSSR 12-71A, AFIT/SL, Wright-Patterson AFB OH, February 1971.
6. Johnson, Robert C. Air Force Human Resources Laboratory (AFHRL)/ASR, Wright-Patterson AFB OH. Personal interview. 31 July 1979.
7. _____ and Donald L. Thomas. "To Collect Data for the C-141A JPA Utilization Study," Trip Report. Air Force Human Resources Laboratory (AFHRL/ASR), Wright-Patterson AFB OH, 16 December 1975.

8. Potter, Norman R., and Donald J. Thomas. "Evaluation of the Three Types of Technical Data for Troubleshooting," Vol. I. Air Force Human Resources Laboratory, Air Force Systems Command, Brooks AFB TX, September 1976.
9. Richardson, Lieutenant Colonel Sanford A., USAF, and Captain Thomas E. Syster, USAF. "An Analysis of User Acceptance and Perceived Useability of C-141A Job Guides." Unpublished master's thesis, LSSR 36-77B, AFIT/SL, Wright-Patterson AFB OH, September 1977.
10. Siegel, Sidney. Nonparametric Statistics for the Social Sciences. New York: McGraw Hill Book Company, Inc., 1956.

B. RELATED SOURCES

Cancellieri, Captain Robert, USAF, and Major David S. Willoughby, USAF. "The Study of the Relationships Between Demographic Factors and SAC Missile Combat Crew Members' Attitudes." Unpublished master's thesis, LSSR 34-77B, AFIT/SL, Wright-Patterson AFB OH, September 1977.

Hernandez, Lieutenant Colonel Florencio, VAF, Captain Terrell T. Coco, USAF, and Captain John T. Hamm, USAF. "A Study of the Impact of Personality Differences on Troubleshooting Performance." Unpublished master's thesis, LSSR 33-77A, AFIT/SL, Wright-Patterson AFB OH, June 1977.

Nie, Norman H., et al. Statistical Package for the Social Sciences. 2d ed. New York: McGraw-Hill Book Company, 1975.